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X-Analysis User Manual

Software version 11.0, 12022015

Publication Information

© 2015 Fresche Legacy Inc.
Published by:

Fresche Legacy Inc.
995 Wellington
Suite 200
Montreal, QC
Canada, H3C 1V3

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Title: X-Analysis User Manual, software version 11.0

Publication Date: February 2015

Note: <Activation information or other notes>

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Contents

Publication Information **2**
Contents **3**
Preface **9**
Overview **11**
Acronyms used in the Manual 11
Introduction to X-Analysis **12**
Profile Authority Requirements 12
Configure Cross-Reference Library **13**
Work with X-Analysis for Applications 13
Libraries 14
Exclusions 16
Initialization 17
Generating the Data Model 19
Refresh the Cross-Reference Library 20
Variable Program Calls from Files/Programs 21
Using X-Analysis Client **25**
Sign-on Dialog 25
Session Information 27
X-Analysis Menu 28
X-Analysis Preferences 43
Advanced Preferences 45
Folders Preferences 48
General Preferences 49
X-Data Test Preferences 51
X-Redo Preferences 53
X-Redo Advanced Preferences 54
Application Library **56**
Work with Application Libraries 56
Application Library Menu Options 57
New Application Area 57
Add Alternate Data Library List 57
Refresh Options 62
Derive Business Rules 65
Import Options 66
Export Options 67
Document Entire Application 70
Document Changed Objects 70
Reengineer Programs 70
Generate Programs 72

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Inter-Repository Options 73
Audit Options 74
Work With Multiple List Options 74
Object List 75
Member List 82
Source Files 83
Business Rules 84
Consolidated Rules 84
Screen Components 85
Change History 88
Regenerated Programs 90
Source Scan 91
Procedures 93
Application Area 97
Add Application Area 97
Adding Object to an Application Area 98
Removing Object from an Application Area 100
Context menu on an Application Area 101
Application Area Options 102
Derive Business Rules 107
Export Options 107
Annotate 107
Document Application Area 107
Data Management Options 107
Test Management Options 108
Reengineer Programs 114
Generate Programs 114
Audit Options 114
UML Options 114
DDL Modernization node on an Application Area 116
Application Area Diagramming 128
Application Area Diagram 128
Area Flow Diagram 131
Quick Reference to an Object 133
Jump to Dialog 133
Source Browser View 135
Object Where Used 150
Variable Where Used 151
File Field Details 155
LFs/Access Paths 156
Member X-Ref 156
Enhanced Member X-Ref 158
Add Bookmark 158

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Program Logic Documentation 161
Data Flow Diagram 161
Structure Chart Diagram 170
Application Area SCD 177
Hierarchical Structure Chart Diagram 177
Inverted Structure Chart 184
Program Structure Chart/PSC 185
Overview Structure Chart/OSC 186
Screen/Report Design 193
Screen Flow Diagram 195
Access Path Diagram 198
Screen Activity Diagram 199
Data Model Diagram 201
Generating DMD 203
DMD for an Application Area 204
Understanding Data Model Database 206
Options on Screen Components 207
Screen Source Code 207
Function Editor 208
Preview Designer 211
Page Designer 212
Data Content 215
Screen Actions 216
Class Diagram 218
Business Rules 218
Component Documenter 219
Annotate 220
Development Screens 221
Business Rules Analysis 223
Business Rules 223
Derive Business Rules 224
View Business Rules 226
Inter-Repository Options 230
Generate Difference Analysis 231
Display Difference Analysis 231
Customized Libraries 233
Generate PTF Analysis 233
PTF Analysis 234
Manage Linked Repositories 237
Audit Options 241
Metrics Analysis 241
Screen Metrics 250
File Metrics 253

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Business Process Logic Metrics 254
Specialized Analysis 254
Problem Analysis 262
Object Allocation 264
Database Summary 265
Summary Report 265
Initialize Source Archiving 269
Generate Metrics Analysis 270
Edit Problem Categories 270
Generate Problem Analysis 275
UML Diagramming 276
The Pre-requisites 276
Re-generate UML 276
Activity Diagram 276
Class Diagram 278
Re-generate UML for Application Area 280
Data Management Features 281
View Data 281
Data Dictionary 281
Override Data Dictionary 285
Override Relationship Details 287
Verify Data Relationships 288
Subset/Archive Filter 291
Subset Data 293
Archive Data 294
Purge Data 295
Archive & Purge Data 296
Exporting & Printing 298
Export to PDF 298
Export to Microsoft Word 299
Export to Microsoft Excel 299
Export to Flowchart 300
Printing from X-Analysis 302
Export as DDL from X-Analysis 302
Convert DDS to SQL 305
Generate Database Service Programs 311
Document Manager 315
Marking the individual objects/complete list 315
Documenting an Application Area 328
Documenting an Entire Application 353
Document Changed Objects 353
Viewing the Generated Document 353
Limitations of X-Analysis System Documenter 356

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Using the Annotator 356
Appendix A – X-Analysis Offline 358
X-Analysis Offline Prerequisites 358
Start X-Analysis Offline 359
Appendix B – Enabling the SEU Interface 361
Create User Profile XAN4SEU 361
Creating macro of XAN4SEU 362
Appendix C – Component Documenter 366
Work with Component Documenter 366
Appendix D – XREDOAPP Command 375
Set the Library List 375
Options available on the XREDOAPP command interface 376
X-2E Data Areas 388
Appendix E – Overriding Data Tables 390
Synon Function Key / Option Defaults 390
Synon Function Key/Option Extra Defaults 391
Appendix F – X2E Specific Features 392
Reengineering of Non-2E Programs 392
Action Diagram 395
Business Rules 396
Migrated Logic 397
Reengineered Action Diagram 398
INTERNAL ROUTINES Objects 399
Business Process Logic Metrics 400
Generating Java application 402
Appendix G – Troubleshooting 405
X-Analysis Perspective not visible/working after upgrading X-Analysis Client 405
X-Analysis menu on the main menu bar disappears from X-Analysis Perspective 406
Error in running X-Analysis installed on Windows Vista for the first time 406
Initialization reports 407
System documentation failed: FileNotFoundException 408
SWTException on Windows 2000 machines 408
Screen/Report Design feature fails with Server Job Error 409
X-Analysis Diagnostics utility 409
Error message appears on Signon to X-Analysis 410
Data Flow Diagrams are unavailable 411
Setting the password field 413
Error in generating program documentation 414
Using the French interface 415
Appendix H – Refresh X-Analysis 416
XREFRESH 416
XAXREF 418
Appendix I – X-Analysis Indexes Job Scheduler Entries 422

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Command XASCDEIDX 422
Command XAROBOT 422
Appendix J – Dual Installation of X-Analysis 424
Appendix K – Use SSL feature 425
Appendix L – Setting Status for Business Rules 428
Business Rules Status* 428
Business Rules Status Category 433
Appendix M – Export to Google Drive 436
Index 449

Preface

ABOUT THIS GUIDE

This guide, X-Analysis User Manual, describes how to use X-Analysis and its other related modules. In particular it discusses the following topics:

- Configuring X-Analysis
- Using X-Analysis Client
- License Manager (V2 licensing)
- Application Library/Areas
- Diagramming features
- Screen Components
- Business Rules Analysis
- Audit Options
- Document Manager

Version

This guide describes X-Analysis, Version 11.0.

How to use this guide

The manual has 17 chapters. Each chapter throws light on one or more of the diverse X-Analysis features which adequately support advanced analysis and documentation tasks. The Appendices contain the other crucial technical details relevant to understanding and using X-Analysis. The topics progress from general ideas to more advanced concepts, building on the earlier chapters.

This guide will prove to be very useful for software professionals–from analysts and developers to architects and operations teams–intending to analyze, document, or modernize AS/400 IBM i applications. Explore this guide to gain insight into the inimitable facets of X-Analysis that equip users with rich understanding of existing legacy applications.

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The X-Analysis suite of products contains a total of eight modules. This guide describes only the following module, X-Analysis. For information about the other modules, please contact your Fresche Legacy representative, or visit us at www.freschelegacy.com.

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Overview

A comprehensive, stepwise, illustrative guide that encapsulates the advantages of X-Analysis as a multipurpose software product suite!

X-Analysis comes fully equipped to address all analysis and documentation needs – from analyzing Metrics to decoding monolithic Business Rules and many more. In sum, X-Analysis is a power-packed toolset, designed to keep technical complexities at bay, making conversion of existing application designs into the latest format a much easier exercise.

ACRONYMS USED IN THE MANUAL

Acronym	Full Form
APD	Access Path Diagram
DFD	Data Flow Diagram
DMD	Data Model Diagram
FFD	File Field Details
SCD	Structure Chart Diagram
HSC	Hierarchical Structure Chart
PSC	Program Structure Chart
OSC	Overview Structure Chart

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Introduction to X-Analysis

X-Analysis[#] is a proven world-leading tool used by analysts, developers, architects and operations teams for analysing, documenting, modernizing, and rebuilding of IBM i applications. It provides detailed analysis and interactive diagrammatic constructs that enable rich understanding of existing applications. It also has a set of powerful re-engineering facilities for automated database and application modernization which are integrated with the analysis and design extraction functions. Whether an application is poorly structured or highly structured (e.g. Synon / 2E applications), X-Analysis can extract the design logic of the application, providing an excellent base for efficient and effective design recovery.

X-Analysis is a suite of modules fully integrated with IBM Rational products (WDSc, RDp, RDi, etc.) and MyEclipseBlue. It also runs standalone on Eclipse without any other product dependencies. Individual modules are grouped together to provide useful solution sets that meet a number of requirements around a central theme.

Profile Authority Requirements

The initialization/refresh jobs make extensive use of various IBM i commands like CRTDUPOBJ, CRTPF, CRTLF, DLTF, RGZPFM, RTVMBRD, CRTLIB, CLRLIB, RSTLIB, DLTLIB, DSPFD, DSPFFD, DSPPGMREF, DSPDBR, CLRPFM, CPYF, CRTDTAARA, RTVOBJD, ALCOBJ, DLCOBJ, DLTUSRIDX, DSPOBJD, RTVSYSVAL, RTVDTAARA.

In order to run the X-Analysis jobs on an IBM i machine, it is recommended to use the **QPGMR** profile or the user profile having **QPGMR** as the group profile.

Regardless of the profile used, you should have the following authorities:

- The profile must have a ***USE** authority to all of the commands listed above and also ***SAVSYS** special authority.
- For the Source and the Object libraries specified during setup – The profile used requires object operational (***OBJOPR**) authority to all programs and files in these libraries. The profile also requires execute (***EXECUTE**) authority on all of these libraries.
- For the X-Analysis cross-reference library – The profile used must have full rights to this library. If you do not use the **QPGMR** profile, you must make sure the profile used has ***ALL** rights to all objects in the supplied X-Analysis libraries.

For details, refer to **Initializing_X-Analysis.doc**.

 # X-Analysis release 10.x onwards is digitally signed.

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Configure Cross-Reference Library

Before the X-Analysis Client can be used, the cross-reference library i.e. the application repository has to be built. The initialization process takes care of the setting up of the cross-reference database.

This chapter presents the steps, specific command screens, and the command keys for building a cross-reference library.

WORK WITH X-ANALYSIS FOR APPLICATIONS

On the IBM i, type the **X4WRKAPP** command and press **ENTER**.

X4WRKAPP command screen

```
X-Analysis/4           Work with X-Analysis/4 Applications    Databorough Ltd.
XARWKAPP                                                             12:58:51
                                                                  21 Jan 2015
Enter options, press Enter.
1=Authorities 2=Change 3=Copy 4=Delete 5=Display 7=X-A Log 8=Libraries
9=Variable Calls 10=App areas 11=Reports 12=Initialise 13=Build data model
14=Refresh 15=Gen Business Rules 16=Exclusions 17=Objects 18=Pgm Stds

   X-ref Lib   Text                            Company/division

   XAN4CDXA    XAN4CDEM Tutorial System



F1=Help   F3=Exit  F6=Add    F10=Cmd Line      F12=Cancel   F24=More Keys
```

The **X4WRKAPP** is the master command menu of the X-Analysis Server. The first step is to add a new cross-reference library. Press **F6** to add a cross-reference library.

X4WRKAPP – Add Application screen

```
X-Analysis/4           Work with X-Analysis/4 Applications    Databorough Ltd.
XARWKAPP                                                             13:26:21
                                                                  21 Jan 2015
 X-ref Library. . . . . .
 Text . . . . . .
 Company/division . . . . . .
 Index src files. . . . . .    Y
 Process var & bound calls. . .    Y
 Include obsolete source  . . .
 Build data model . . . . . .
 Data model match value   . . .
 TCPIP address  . . . . . .
 User iD  . . . . . .


F1=Help        F3=Exit        F12=Cancel
```

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This option will add an entry to the list of the X-Analysis/4 applications and create a new (empty) cross-reference library. You must specify the name of the cross-reference library (e.g. **XAN4CDXA**). You can optionally specify text and a company name.

X4WRKAPP – Application added

```
X-Analysis/4          Work with X-Analysis/4 Applications    Databorough Ltd.
XARWKAPP                                                            13:26:21
                                                                  21 Jan 2015
 X-ref Library. . . . . . . . .    XAN4CDXAT
 Text . . . . . . . . . . . . .    XAN4CDEM1 Tutorial System
 Company/division . . . . . . .
 Index src files. . . . . . . .    Y
 Process var & bound calls. . .    Y
 Include obsolete source  . . .
 Build data model . . . . . . .
 Data model match value   . . .
 TCPIP address  . . . . . . . .
 User iD  . . . . . . . . . . .


F1=Help        F3=Exit        F12=Cancel
```

LIBRARIES

After successfully adding the cross-reference library, the next step is to provide libraries for the cross-reference library. These libraries are used when initializing the application and for various other commands which need this information.

Select **Option 8** to assign the Source, Object and Model (2E) Libraries.

X4WRKAPP – Libraries screen

```
X-Analysis/4   Work with X-Analysis/4 Application Libraries   Databorough Ltd.
XARWKLIB                                                            13:28:28
                                                                  21 Jan 2015
Selected x-ref Library -> :   XAN4CDXAT

Enter options, press Enter.
2=Change    4=Delete    5=Display

   Type Sequence Library




F1=Help        F3=Exit        F6=Add         F12=Cancel     F16=Print
```

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The sequence of libraries is important because the objects and the sources are given preference according to the order of the library they belong to. Only the first occurrence of the object/source gets reported. Subsequent occurrences are omitted.

Press **F6** to add the names of the Source / Object / Model libraries associated with the application, and press **ENTER**. Repeat the step if application consists of multiple libraries. Press **F3** when all the libraries have been defined.

X4WRKAPP – Add Library screen

```
X-Analysis/4   Work with X-Analysis/4 Application Libraries   Databorough Ltd.
XARWKLIB                                                            13:28:28
                                                                  21 Jan 2015
X-ref library.     XAN4CDXAT
 Type . . . . .     O          (O=Object,S=Source,M=2E Model)
 Sequence . . .       1.00
 Library. . . .     XAN4CDEM1




F1=Help         F3=Exit         F12=Cancel
```

The Type may be any one of the following:

- O=Object
- S=Source
- M=Model

Source & Object Libraries

While the source library contains the un-compiled source files, the object library comprises the compiled objects for the same.

Specify the libraries containing both source and object as O and S types. See the settings on the 'XAN4CDXA – Tutorial Application'. It has XAN4CDEM specified as 'O' and 'S' types.

Cool/2E (Synon Model) Libraries

In order to analyze a Synon application, the Synon model library(s) can be specified by putting the library type as "**M**". The initialization process picks the data model information in the Synon model library(s) when creating the X-Ref library.

Before moving on to the initialization step, you should confirm that the X2E-specific Data Areas are set with appropriate values. For details, refer to **Appendix D**.

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EXCLUSIONS

The exclusions can be set up using the "**Exclusions**" option from the master command menu – **X4WRKAPP**. Select **Option 16** to do this and press **ENTER**.

X4WRKAPP – Work with Exclusions screen

```
X-Analysis                    Work with Exclusions            Databorough Ltd.
XARWKXCS                                                              13:39:42
                                                                   21 Jan 2015
Enter options, press Enter.
5=Work with

   Program    Description

   XARWKSCE   Work with Diagram Exclusions
   XARWKSFE   Work with Source File Exclusions
   XARWKBRC   Work with Business Rule Call Exclusions
   XARWKHRE   Work with Hierarchy Exclusions
   XARWKUMLE  Work with UML Exclusions




F1=Help  F3=Exit  F10=Cmd line  F12=Cancel  F14=WRKSBMJOB  F24=More keys
```

The exclusions screen provides a menu for object exclusion. The options are:

- **XARWKSCE** – Work with Diagram Exclusions
- **XARWKSFE** – Work with Source File Exclusions
- **XARWKBRC** – Work with Business Rule Call Exclusions
- **XARWKHRE** – Work with Hierarchy Exclusions
- **XARWKUMLE** – Work with UML Exclusions

XARWKSCE – Work with Diagram Exclusions

The objects which are excluded using this option will not appear in the following:

- Structure Chart Diagrams
- Data Flow Diagrams
- Object Where Used data
- Application Areas

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Note: The excluded programs will appear in the Program Structure Charts.

You should specify an object name and any required descriptive text. The object name can be generic. If an individual object name is specified, then it is validated against all objects currently loaded into X-Analysis. If a file name is specified, then it must be a physical file name. All logical views built over an excluded physical file are also excluded.

XARWKSFE – Work with Source File Exclusions

Use this option to exclude source files. Excluded source files will not be loaded into X-Analysis. Specify a particular or generic file name. You can specify a particular library name or ***ALL,** or leave the name blank. A blank library name is equivalent to ***ALL**.

XARWKBRC – Work with Business Rule Call Exclusions

Use this option to set up Business Rule call exclusions. Specify program name which you wish to exclude.

XARWKHRE – Work with Hierarchy Exclusions

The **Hierarchy Exclusion** option is used to prevent all the programs called by the excluded programs to be shown in the Structure Chart Diagram and the Overview Structure Chart. The excluded programs in SCD or OSC are highlighted by a green arrow next to it.

XARWKUMLE – Work with UML Exclusions

Use this option to exclude objects for UML diagram. Specify the object name which you wish to exclude from the UML diagram.

INITIALIZATION

The initialization can now be executed. From the master command (**X4WRKAPP**) screen, select **Option 12** against the cross-reference library for initialization.

```
                        Initialise X-Analysis/4 (XAXREF)

Type choices, press Enter.

X-Analysis Library . . . . . > XAN4CDXAT     Name
Object Libraries . . . . . .   *SPECIFIED    Name, *SPECIFIED
               + for more values
Source Libraries . . . . . .   *SPECIFIED    Name, *SPECIFIED, *NONE
               + for more values
Index Source Files . . . . .   *CHG          *CHG, *NO, *ALL, *UPG
Build Data Model . . . . . .   *NO           *YES, *NO
Generate Business Rules  . . .   *NO         *YES, *NO
Initialise X-Resize  . . . . .   *NO         *YES, *NO
Include obsolete source/object     *NO       *YES, *NO
```

```
                                                                      Bottom
F3=Exit    F4=Prompt    F5=Refresh    F12=Cancel    F13=How to use this display
F24=More keys
```

You can change the default job queue (QBATCH) by changing the job description for XAOBJ/XAN4. Use the following command to change the job description:

WRKJOBD JOBD(XAOBJ/XAN4)

You should also change XAOBJ/XDMJOBD, as this is used by Option 13=Build Data Model on X4WRKAPP (for XA4MODEL command).

Press **ENTER** to submit a batch job, which executes the initialization steps.

Feature	Brief Description
X-Analysis Library	The X-Analysis cross-reference library name.
Object Libraries	Special value *SPECIFIED is selected by default. It means that X-Analysis will retrieve all object libraries you have previously specified (using **Option 8**).
Source Libraries	Special value *SPECIFIED is selected by default. It means that X-Analysis will retrieve all source libraries you have previously specified (using **Option 8**).
Index Source Files	Specify whether or not to create indexes over the source files. These indexes will allow the immediate display of "where used" data. They may be required for the generation of the data model, depending on which options are taken. If the indexes are not built now, they can be built for an individual Source Member at the time they are viewed through the X-Analysis browser. Select one of the following: • ***CHG** – Only update current indexes. It will find newly added source members and remove deleted members. It will also index any source member that has changed since the last initialisation. • ***NO** – Do not build the indexes • ***ALL** – It is similar to *CHG when it comes to finding new members and removed members. It will index all source members without checking the change date. • ***UPG** – Upgrade the X-Analysis database and rebuild all data including all indexes (replacing current ones).
Build Data Model	If you take the option to build the data model for your application then you can view it through X-Analysis. Select one of the following: • ***YES** – Build the data model • ***NO** – Do not build the data model **Should have the X-Analysis Professional set for this to work.**
Generate Business Rules	If you take the option to generate the business rules for your application then you can view it through X-Analysis. Select one of the following: • ***YES** – Generate Business Rules • ***NO** – Do not generate Business Rules **Should have the X-Rules set for this to work.**

Feature	Brief Description
Initialize X-Resize	If you take the option to generate the X-Resize Project for your application then you can view it through X-Analysis. Select one of the following: • *YES – Initialise X-Resize Project • *NO – Do not initialise X-Resize Project **Should have the X-Field Resize Module for this to work.**

GENERATING THE DATA MODEL

You should attempt to build the data model only if you have purchased the Re-engineering Data Modelling Module.

X-Analysis provides a data-modelling environment on IBM i. It can re-engineer a current application, and then automatically generate the data model and the process model. The (logical) data model or entity relationship diagram is derived from the physical data model implicit in the application.

The initialization procedure asks for generating the Data Model. If you have not generated the Data Model, then the next step is to generate it. To do this, select **Option 13** on the **Work with X-Analysis/4 Applications** menu.

```
X-Analysis/4          Work with X-Analysis/4 Applications    Databorough Ltd.
XARWKAPP                                                            13:26:21
                                                                 21 Jan 2015
Enter options, press Enter.
1=Authorities 2=Change 3=Copy 4=Delete 5=Display 7=X-A Log 8=Libraries
9=Variable Calls 10=App areas 11=Reports 12=Initialise 13=Build data model
14=Refresh 15=Gen Business Rules 16=Exclusions 17=Objects 18=Pgm Stds


   X-ref Lib   Text                            Company/division
   XAN4CDXA    XAN4CDEM Tutorial System
13 XAN4CDXAT   XAN4CDEM Tutorial System
```

Press **ENTER**.

```
                      Generate Data Model (XA4MODEL)

Type choices, press Enter.

X-Analysis library . . . . . > XAN4CDXAT     Name
Data libraries . . . . . . . > XAN4CDEM1     Name
               + for more values
Model method . . . . . . . . > *PGMLOGIC     *PGMLOGIC, *NAMES, *CA2E...
```

Press **ENTER** to run the modelling command. This principal command runs in batch and completes the modelling process.

Feature	Brief Description
X-Analysis Library	The X-Analysis cross-reference library name.

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Feature	Brief Description
Object Libraries	Specify the data library names.
Model Method	***PGMLOGIC** – Derive foreign keys from RPG/LE program logic. Relationships are only considered valid when foreign keys match all the components of the owning file's primary identifier. ***CA2E** – The entire data model has been generated by Synon. Use only the Synon data model database to derive the data model. ***NAMES** – Only derive foreign keys for owning relationships, taking into account the option specified in the 'Matching Method' parameter. ***BOTH** – Derive foreign keys taking into account the Program Logic and the *NAMES OR Program Logic and *CA2E (in case of CA2E application).

REFRESH THE CROSS-REFERENCE LIBRARY

Attempt the Refresh option only when you have modified Objects / Members.

X-Analysis provides a refresh command to register changes in Objects/Members of the application library to the cross-reference library. The **XREFRESH** command refreshes the X-Analysis cross-reference database for the specified libraries for all the changed objects.

The refresh will have no effect unless there are changes to (at least) one of the source files registered in the cross-reference database. This command will update the Object and the Member lists immediately, and run a separate job to re-index the appropriate source code.

To run the refresh command from the **5250** screen, go to the master command menu (**X4WRKAPP**) and select **Option 14** against the cross-reference library.

```
X-Analysis/4           Work with X-Analysis/4 Applications    Databorough Ltd.
XARWKAPP                                                             13:26:21
                                                                  21 Jan 2015
Enter options, press Enter.
1=Authorities 2=Change 3=Copy 4=Delete 5=Display 7=X-A Log 8=Libraries
9=Variable Calls 10=App areas 11=Reports 12=Initialise 13=Build data model
14=Refresh 15=Gen Business Rules 16=Exclusions 17=Objects 18=Pgm Stds


   X-ref Lib   Text                              Company/division
   XAN4CDXA    XAN4CDEM Tutorial System
14 XAN4CDXAT   XAN4CDEM Tutorial System
```

Press **ENTER** to invoke the **XREFRESH** command screen (displayed below):

```
                     Refresh Changed Objects (XREFRESH)

Type choices, press Enter.

X-Analysis Library . . . . . > XAN4CDXAT     Name
Refresh Application Areas  . . .   *NO           *YES, *NO, Y, N
Refresh Business Rules . . . . .   *NO           *YES, *NO
```

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Feature	Brief Description
X-Analysis Library	The X-Analysis cross-reference library name.
Refresh Application Areas	If you wish to refresh the Application Areas, select ***YES**. If you select ***NO**, the Application Areas will not be updated.
Refresh Business Rules	If you wish to refresh the Business Rules for each changed program, select ***YES**. If you select ***NO**, the Business Rules will not be updated and you will need to re-generate all Business Rules next time to bring them up-to-date.

VARIABLE PROGRAM CALLS FROM FILES/PROGRAMS

RPG language allows the use of variables in the CALL statements where the variable would contain the name of the next program to be called at run-time. The variable might be getting the next program name through some database file or hard-coding in the program logic itself. In such cases, the display program references command shows the variable name instead of the actual program which would be called at run time. Therefore, some mechanism is required in X-Analysis to identify the possible programs which are called through variables at runtime.

In order to achieve this, **Option 9** has been provided on the **X4WRKAPP** screen where the variable calling setup can be done.

X4WRKAPP command screen

```
X-Analysis/4           Work with X-Analysis/4 Applications    Databorough Ltd.
XARWKAPP                                                              12:58:51
                                                                   21 Jan 2015
Enter options, press Enter.
1=Authorities 2=Change 3=Copy 4=Delete 5=Display 7=X-A Log 8=Libraries
9=Variable Calls 10=App areas 11=Reports 12=Initialise 13=Build data model
14=Refresh 15=Gen Business Rules 16=Exclusions 17=Objects 18=Pgm Stds

   X-ref Lib   Text                              Company/division

   XAN4CDXA    XAN4CDEM Tutorial System



F1=Help   F3=Exit  F6=Add    F10=Cmd Line      F12=Cancel   F24=More Keys
```

This provides access to the following:

Variable Program Calls from Files: The user can add the relevant file containing the info about the program names to be called. The files listed in this screen are called **Generic Files**. These files are read by the program(s) to determine which programs to call based on certain keys.

Work with Generic Files allows users maintain the details of the files which are read by a program in order to determine which programs to call.

Press **F6** to add a Generic File.

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The following data should be maintained:

File name: The name of the database file which is used to retrieve the name of the programs to be called (the generic file). The name entered can be either a physical or a logical file name but it must be a 'keyed' file.

Key type – This field indicates the type of data used to retrieve the 'called program' name. Choose from:

***ALL** – All records in the file are to be scanned to find the possible programs that can be called by the program.

***CONSTANT** – All records keyed by any value which is moved into the key field name (see below) within the calling program refer to programs which can be called by the program.

Key field name – This field **only** applies when the key type is specified as ***CONSTANT**. It identifies the name by which the key field is 'referred to' in the calling program. This is the field which has values moved into it to determine which programs should be called.

Variable Program Calls from Programs: This case is for the generic programs which are called by the other program – to either return the names of the programs to call or call further programs directly. The purpose of this setup is to bypass the intermediate (generic) program and directly display the actual/second-level program.

Press **F6** to add a Generic Program.

The following data should be maintained:

Program name – The name of the program which is called to call further programs.

Key Type – This field indicates the method used by the generic program to determine which programs to call. Choose from:

***ALL** – All program references for the generic program are shown as references for the calling program.

***FILE** – The generic program uses a generic file to determine which programs to call. The references as defined through Work with Generic Files will be shown as references for the calling program.

File name – This field **only** applies when the key type above is specified as ***FILE**.

The file name is validated against the files maintained through the **Work with Generic Files** screen

Demo case

The example illustrated below displays the generic program using the generic file to determine which programs to call.

In this instance, **PG_V5** is a generic program called by **CL_GEN_PGM**. See **PG_V5** as listed under the Generic Programs list.

Work with Generic Programs screen

```
X-Analysis/4                  Work with Generic Programs           Databorough Ltd.
XARWKGPS                                                              12:58:51
                                                                    21 Jan 2015
Enter options, press Enter.
2=Change 4=Delete 5=Display

   Program     Type            File name

   PG_V5       *FILE           PGNAME
```

The following screen shows **PGNAME** as listed under the **Generic Files** list.

```
X-Analysis/4                  Work with Generic Files              Databorough Ltd.
XARWKGFS                                                              12:58:51
                                                                    21 Jan 2015
Enter options, press Enter.
2=Change 4=Delete 5=Display

   File     Key type      Key field name        Called pgm field

   PGNAME   *ALL                              PGM1
```

PGM1 field of **PGNAME** file is considered for variable program calls.

There are two options to specify the Key type –

***ALL:** All the program names for the **Called Program Field** (i.e. **PGM1**) existing in the generic file (i.e. **PGNAME**) will be added as the program references.

***CONSTANT:** It works differently because it tracks the actual constant key value moved in the key field name for selecting the database records matching the key value for the variable call selection.

As an example, below are the entries in the **PGMNAME** file:

```
X-Analysis/4                  Work with Generic Files              Databorough Ltd.
XARWKGFS                                                              12:58:51
                                                                    21 Jan 2015
Enter options, press Enter.
2=Change 4=Delete 5=Display

        COND     PGM1           PGM2
```

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```
000001  A         PG_V2K          PG_V1
000002  B         PG_V3K          PG_V4
****** ******** End of report ********
```

Considering the above setup and example, below program references are added once **XREFRESH** or the initialization process is executed on the X-Ref library:

```
X-Analysis/4                 Work with Generic Files              Databorough Ltd.
XARWKGFS                                                             12:58:51
                                                                    21 Jan 2015
Enter options, press Enter.
2=Change 4=Delete 5=Display

WHPNAM        WHTEXT                          WHFNAM               WHOBTP    WUSAGE
CL_GEN_PGM                                    PG_V2K                 P         I
CL_GEN_PGM                                    PG_V3K                 P         I
****** ******** End of data ********
```

In this example, reference to **Generic Programs** has been deleted, and the references from relevant file/field listing on the "Work with Generic Files" screen has been added. The key type is specified as ***ALL** in the generic file entry. All the program names under the **PGM1** field of **PGNAME** file are considered as dependencies of **CL_GEN_PGM**. Therefore, the object dependencies of **PG_V5** are removed and the program names existing in **PGM1** field of **PGNAME** file are added as the dependencies of **CL_GEN_PGM** program. As a result, the Object Where Used displays the replaced dependencies.

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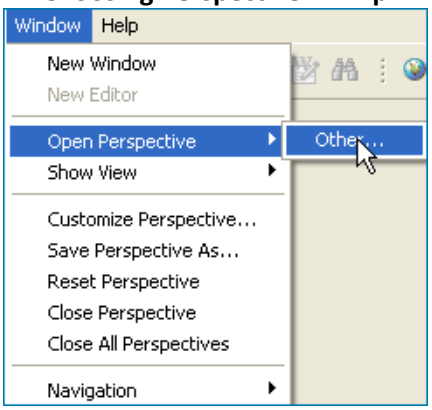
Using X-Analysis Client

SIGN-ON DIALOG

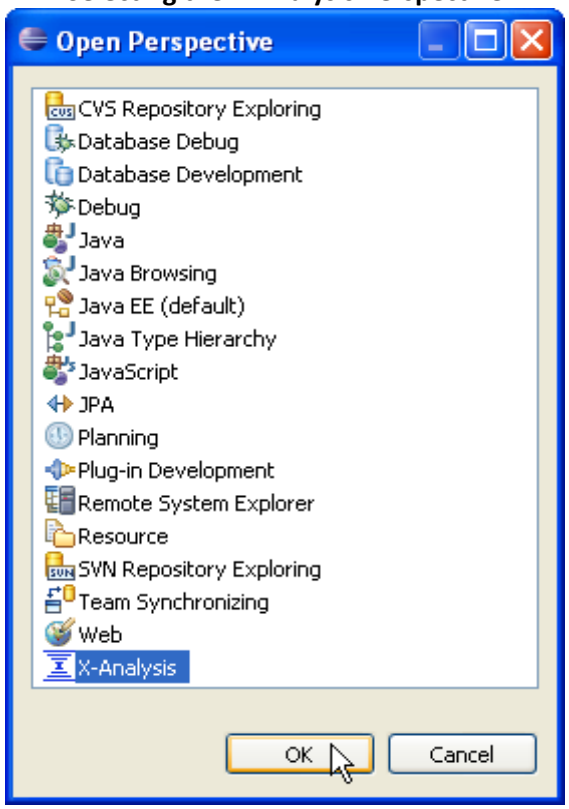
Start IBM's Rational products **7.5** and above or Eclipse **3.4** and above. Select:

Window > Open Perspective > Other > X-Analysis

Choosing Perspective in RDp



Selecting the X-Analysis Perspective



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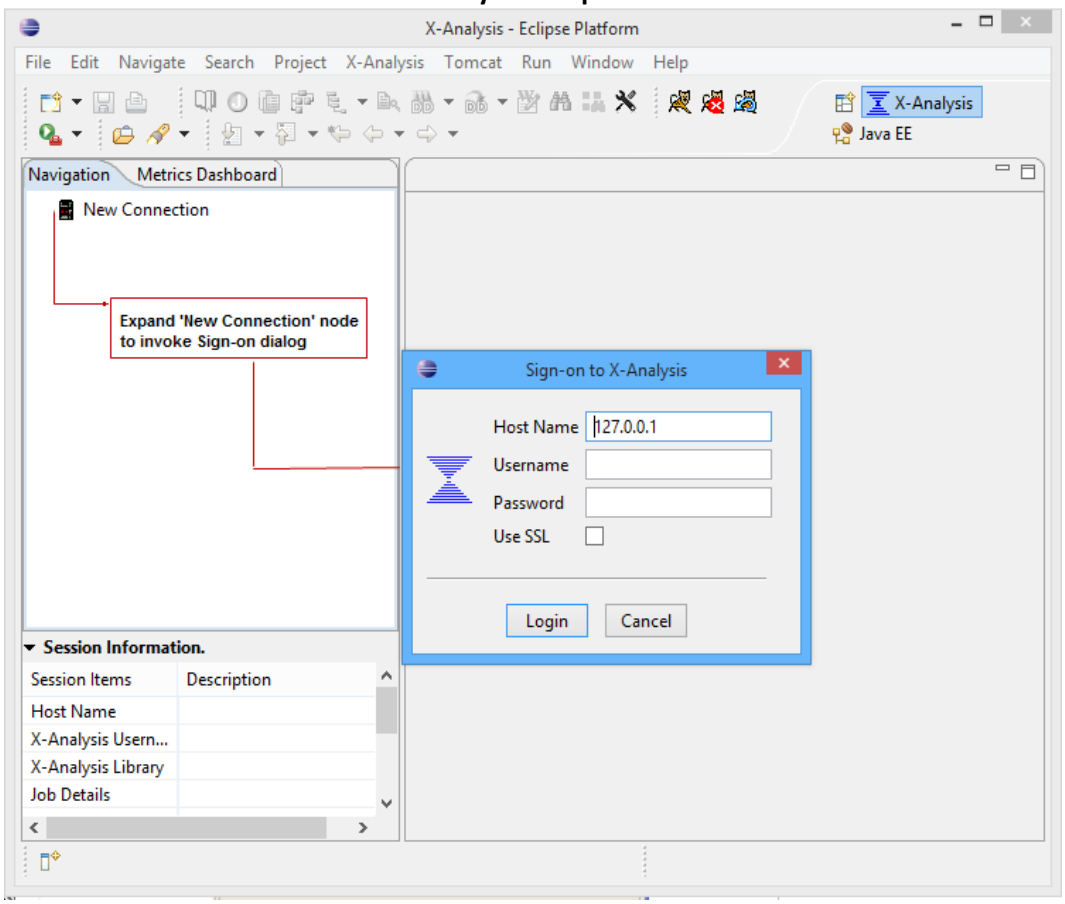
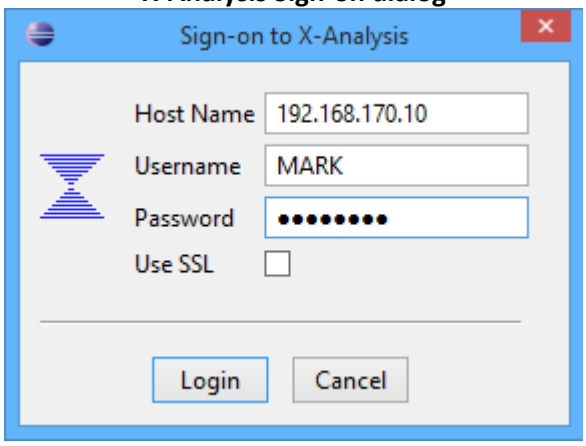
Click **OK** to start the X-Analysis Perspective.

X-Analysis Perspective



Expand the **New Connection** node to bring up the Sign-on dialog.

X-Analysis Sign-on dialog



Enter the following information to the **Sign-on** dialog:

1. Enter the TCP/IP address/Computer Name of the IBM i to be accessed.

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2. Provide the username and the password of a valid IBM i profile.

3. Check the box for '**Use SSL**' feature for additional security. For details, refer to **Appendix K**.

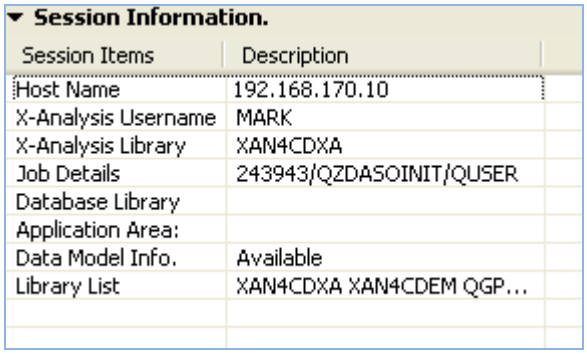
4. Click **Login**.

After successful sign on, X-Analysis lists the application libraries which were initialized using the **X4WRKAPP** command on the IBM i.

SESSION INFORMATION

The X-Analysis Client displays detailed session information about the connection in the associated Session Information view.

Session Information



The Session Information details are as follows:

- **Host Name:** Displays the IP or the web link of the connected IBM i.
- **X-Analysis Username:** Displays the user name which is connected to the IBM i.
- **X-Analysis Library:** Name of the cross-reference library, the user has currently selected.
- **Job Details:** Displays job details in format – Job Number/Job Name/Job User.
- **Database Library:** The Subset Library which is being used to get the data from where the Data View options are selected. This displays a value only when a subset library has been selected.
- **Application Area:** Displays the currently selected Application Area.
- **Data Model Info:** Informs the user whether Data Modelling is available or not.
- **Library List:** Displays the library list for the current job.

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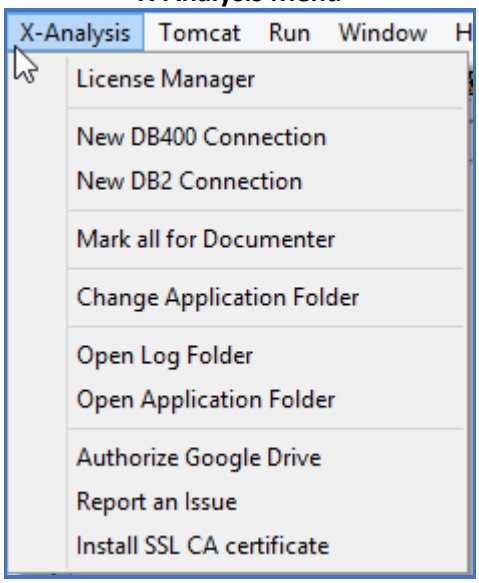
X-Analysis Menu

X-Analysis provides the **X-Analysis** toolbar menu on the Eclipse toolbar. The following screen displays options available on the X-Analysis menu:

X-Analysis Menu



The details of the options provided by the X-Analysis menu are discussed as under:

License Manager

V2 is the new licensing mechanism which adds to the ease of both the new and existing X-Analysis users.

The initial step is to download the **XALicenseManagerTool** from the 'support' folder from the location where X-Analysis is installed. Extract the tool to a preferred location. See the screenshot below:

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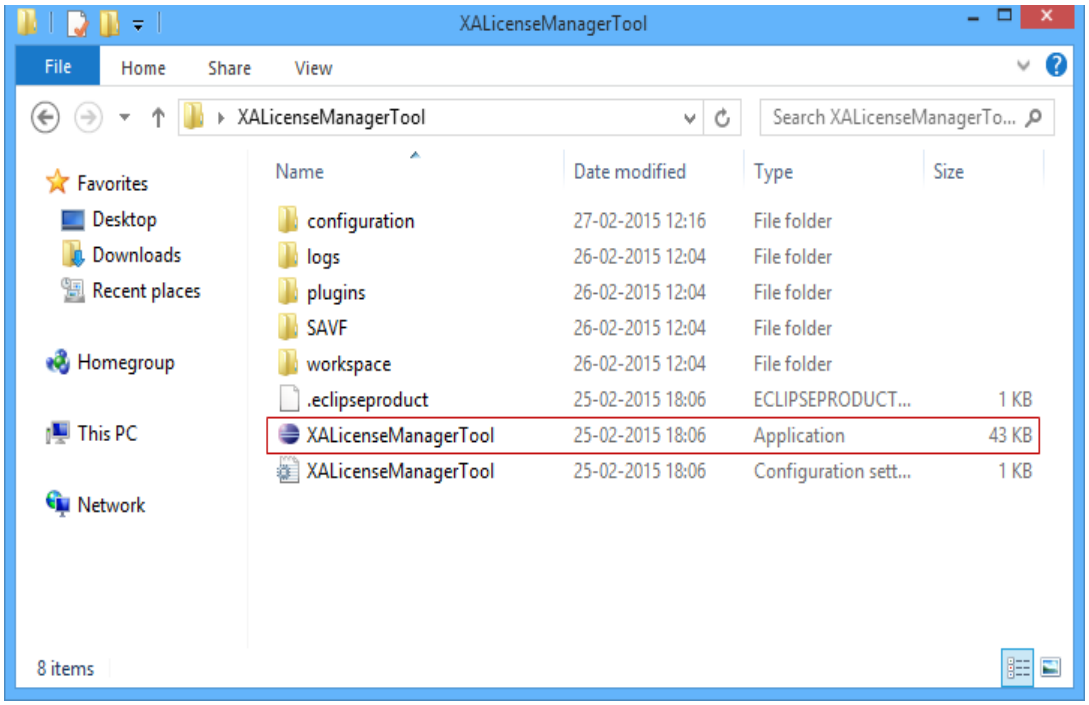
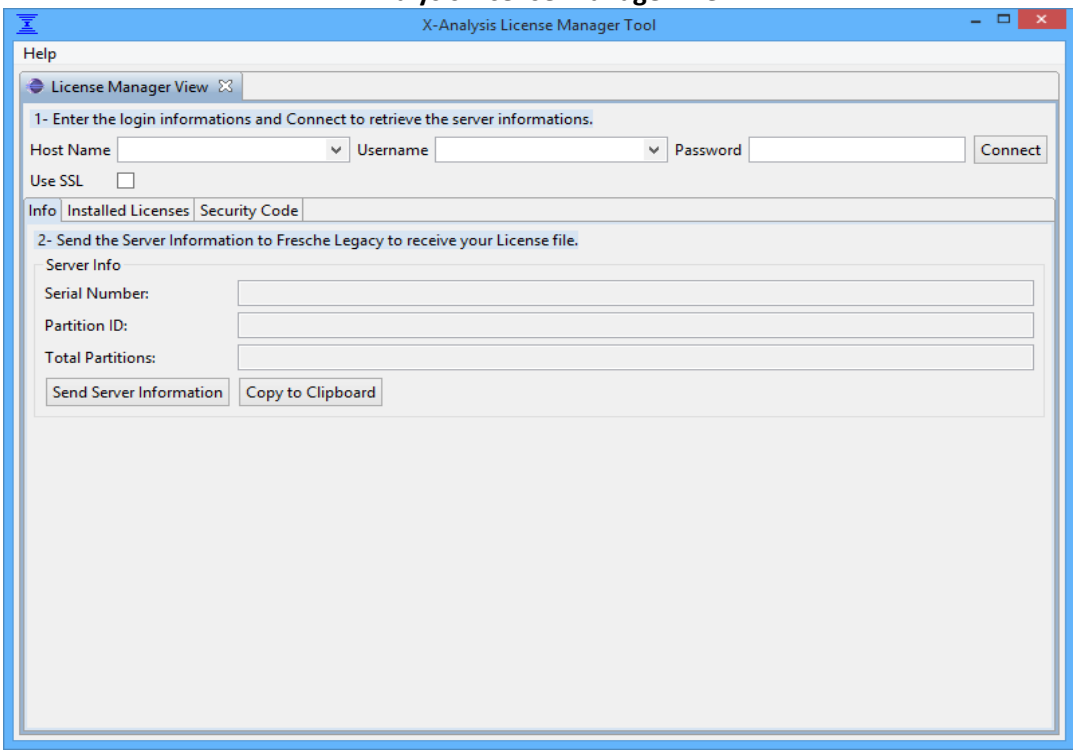


Double-click on the **XALicenseManagerTool.** The following window will be invoked:

X-Analysis License Manager View

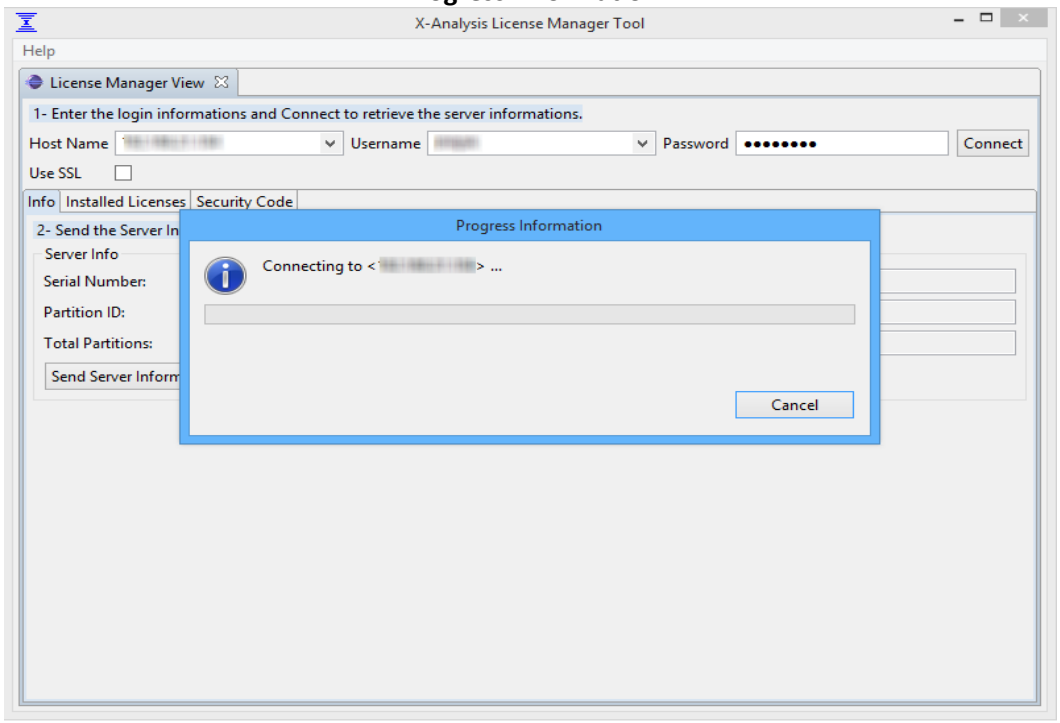


In the above view, provide the Host Name/IP address, Username and Password. Check the **Use SSL** box for the SSL security feature.

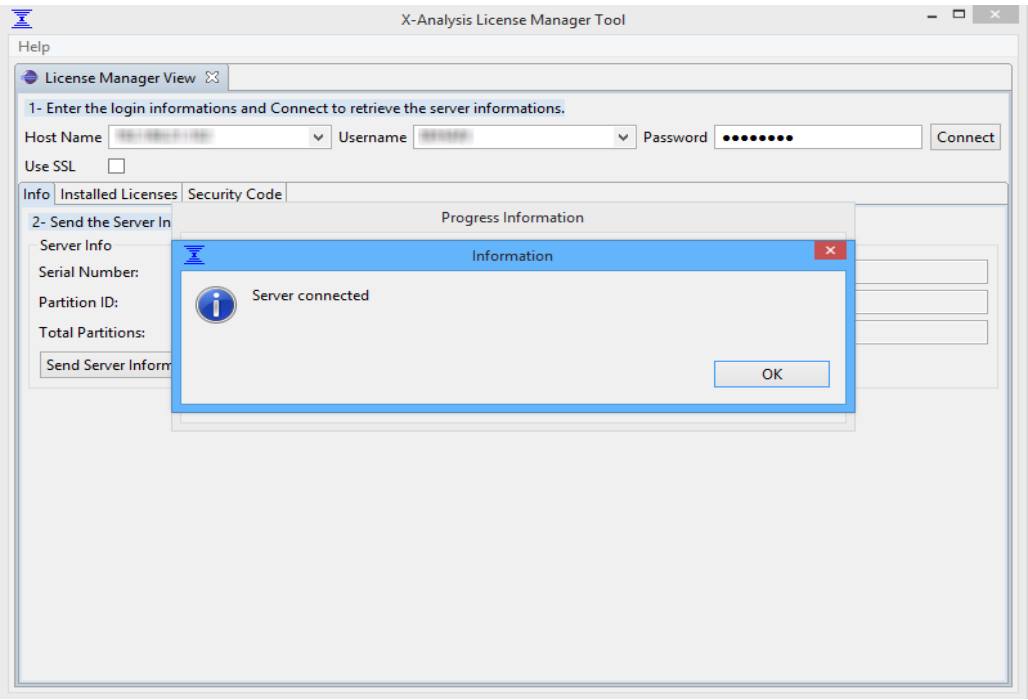
Click **Connect** to authorize the IBM i machine to provide the Serial Number and the Partition Number.

The following window displays the Progress Information.

Progress Information

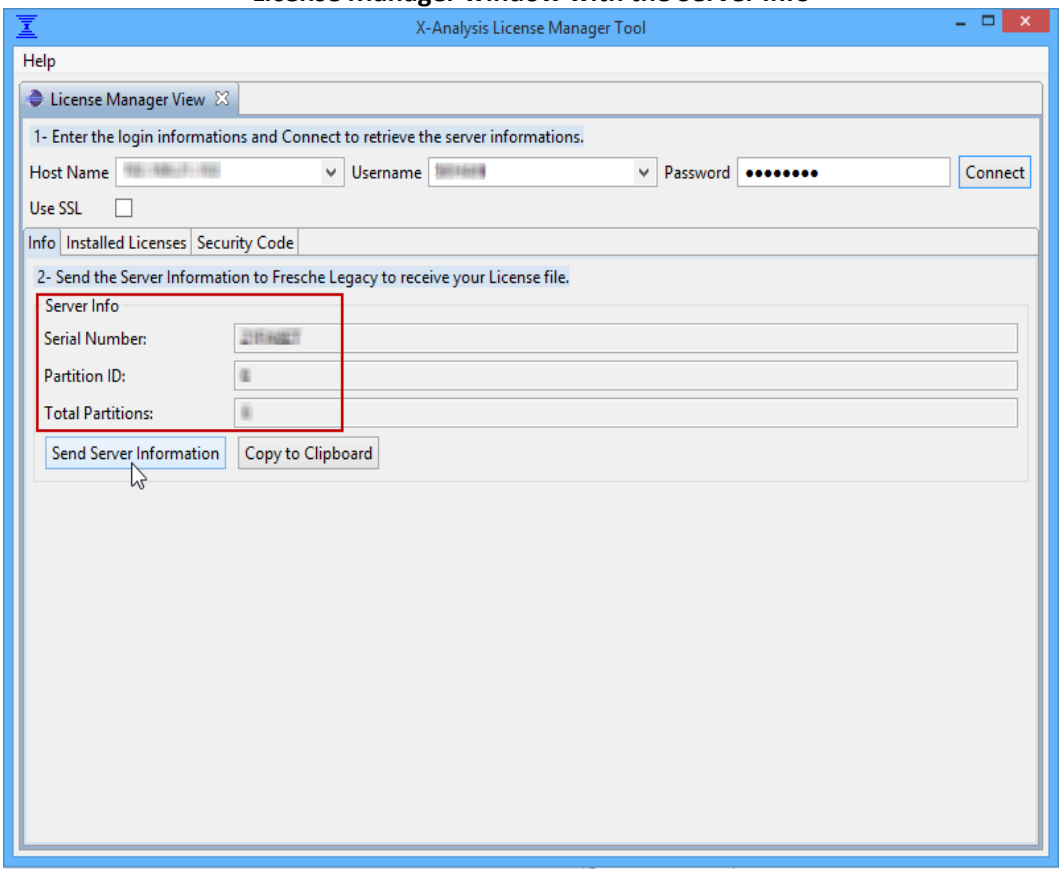


Once the connection is established, the following window is displayed:



Click **OK**. The Server Info will now show the Serial No., Partition ID, and Total Partitions.

License Manager window with the Server Info



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You must wait for the License file to be returned by Fresche.

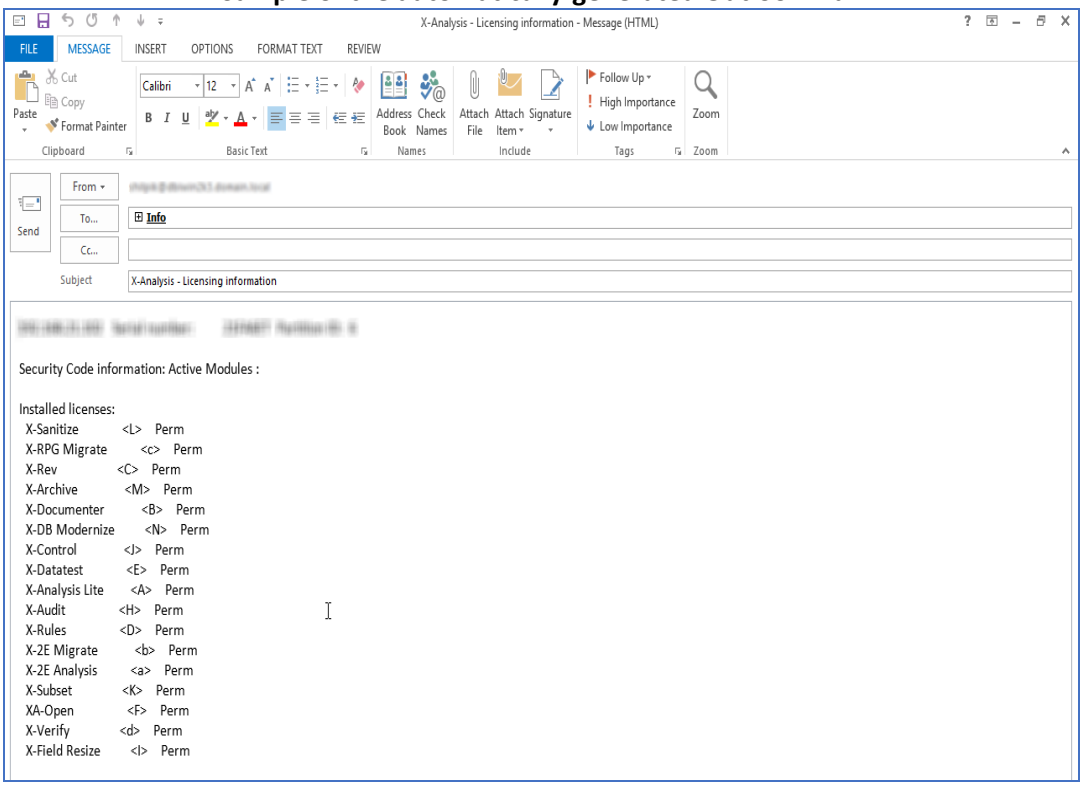
You will require a single license file regardless of the number of partitions you may have for a given machine identified by its serial number.

Note: Install the license file on each distinct partition. Follow the same installation procedure for each partition.

If you decide to clone a partition where XA 11.0 has already been installed/configured, install the license file on the newly-created partition in order for XA to start working on it.

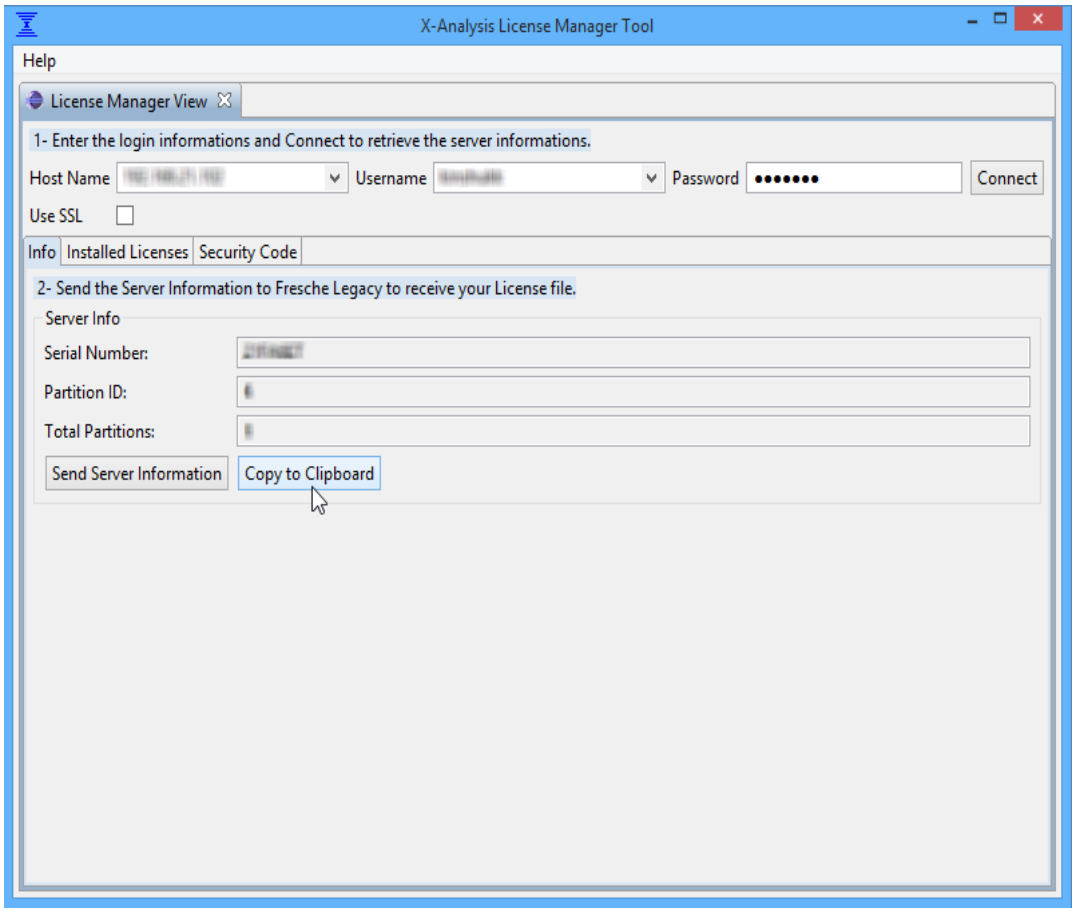
Click on the **Send Server Information** button to send this information to the support team at Fresche prompting them to begin reviewing and processing the license request. A mail will be automatically generated as is shown below.

Sample of the automatically-generated Outlook mail



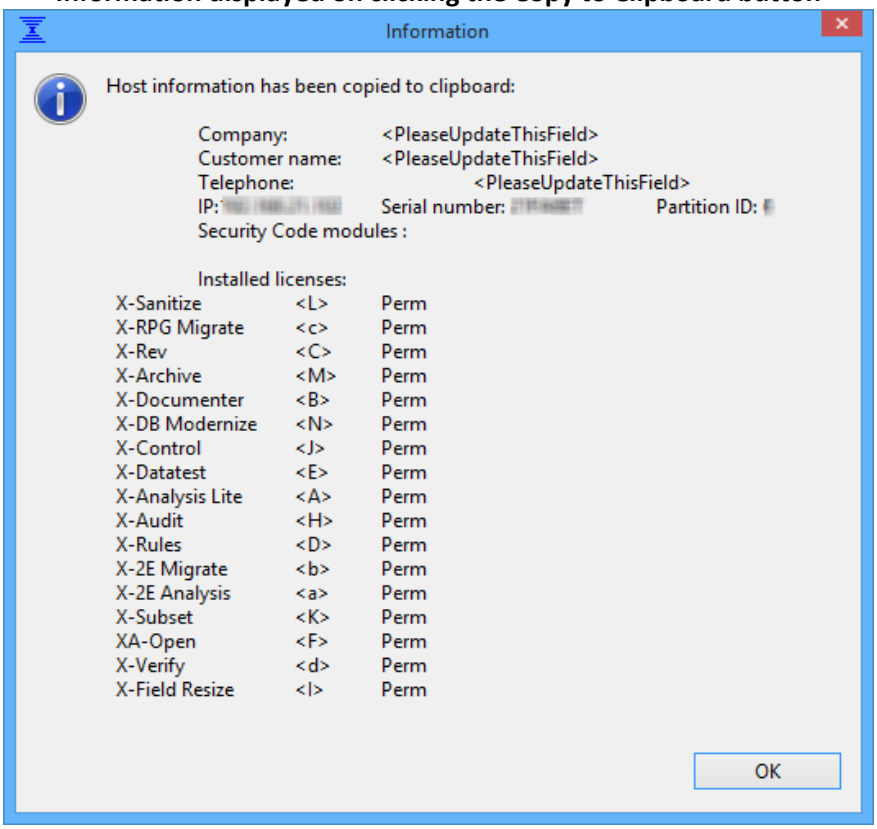
Click **Send**.

Alternatively, you can click on the **Copy to Clipboard** button.



The information gets copied and is displayed as follows:

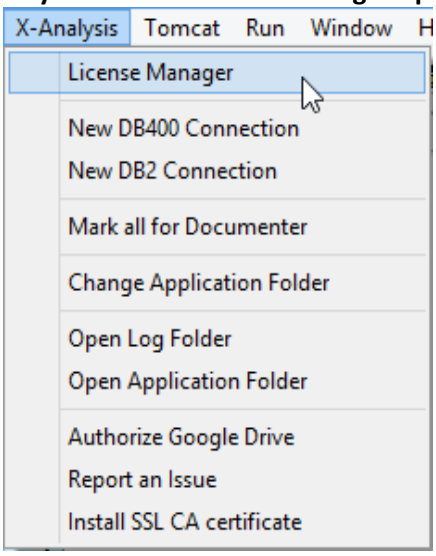
Information displayed on clicking the Copy to Clipboard button



Manually copy the displayed information and mail it to the support team to get the License File.

After you have received the License file, the next step is to install it. Select the **License Manager** option from the X-Analysis menu, as shown below.

X-Analysis menu – License Manager option



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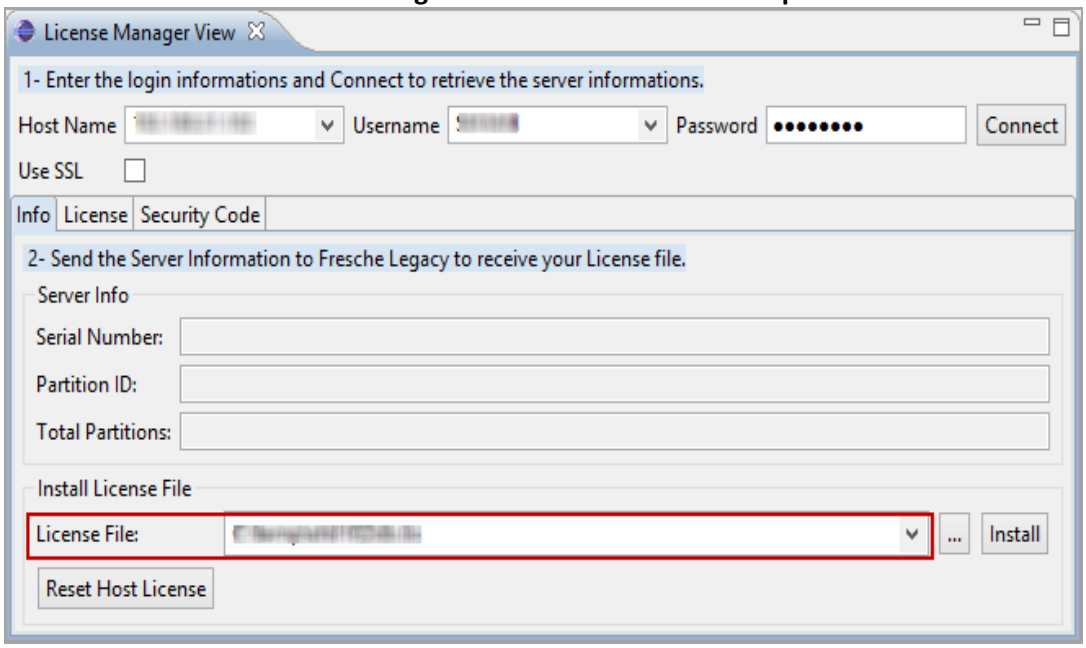
The **License Manager View** will be invoked. Browse and enter the License File path as shown below.

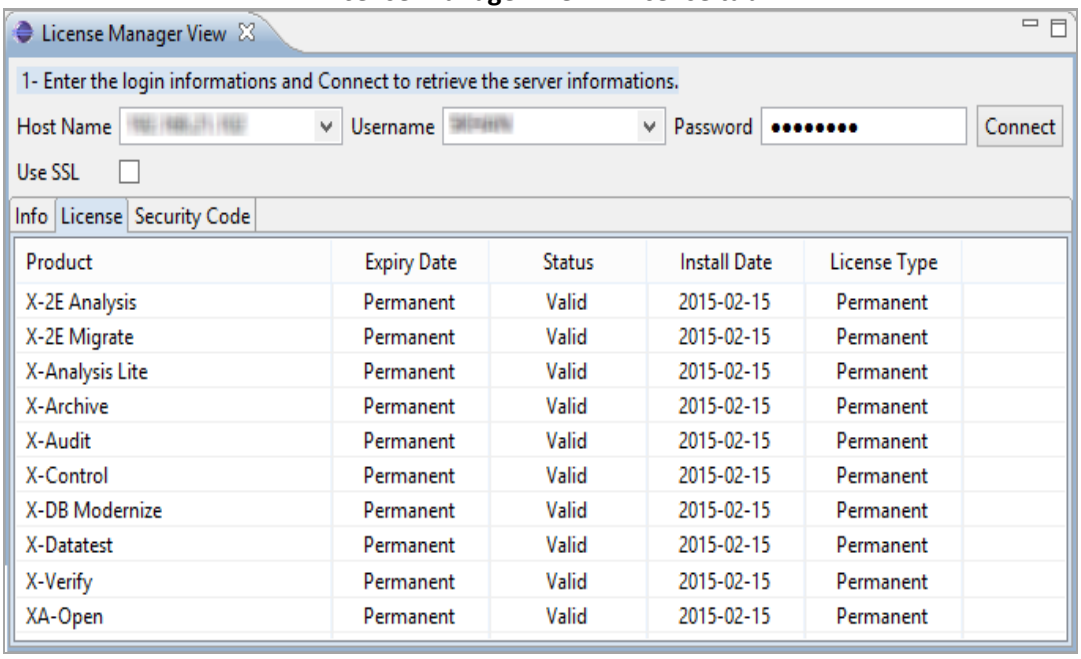
License Manager View with the License File path



Click **Install**. The Install log showing only the licenses included in the specified license file will appear.

Next, click the **License** tab to get a complete list of the installed licenses. It displays all information about the Product, Expiry Date, Status, Install Date, and License Type.

License Manager View – License tab



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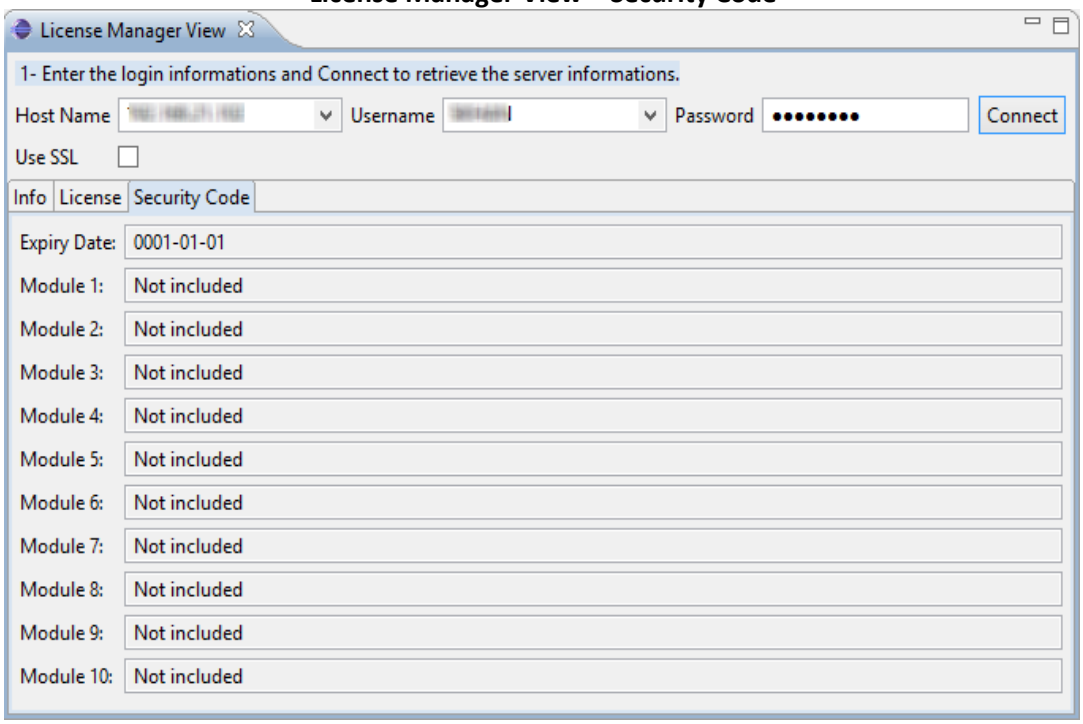
The third tab is **Security Code** which displays any installed V1 modules based on the installed security code. In the absence of any security code, the page will display as empty as is seen in the following view.

License Manager View – Security Code



Note: Proceed with installing the X-Analysis V11 client and server only when you have received the License File from support. Please store the new License file safely.

You can continue to use the old version till you receive the new file.

New DB400 Connection

The X-Analysis menu provides the **New DB400 Connection** option. Through this option, you can create connections to different IBM i servers. Provide valid sign on information when you select the **New DB400 Connection** option. Upon successful sign on, X-Analysis adds a new IBM i node in the navigation view.

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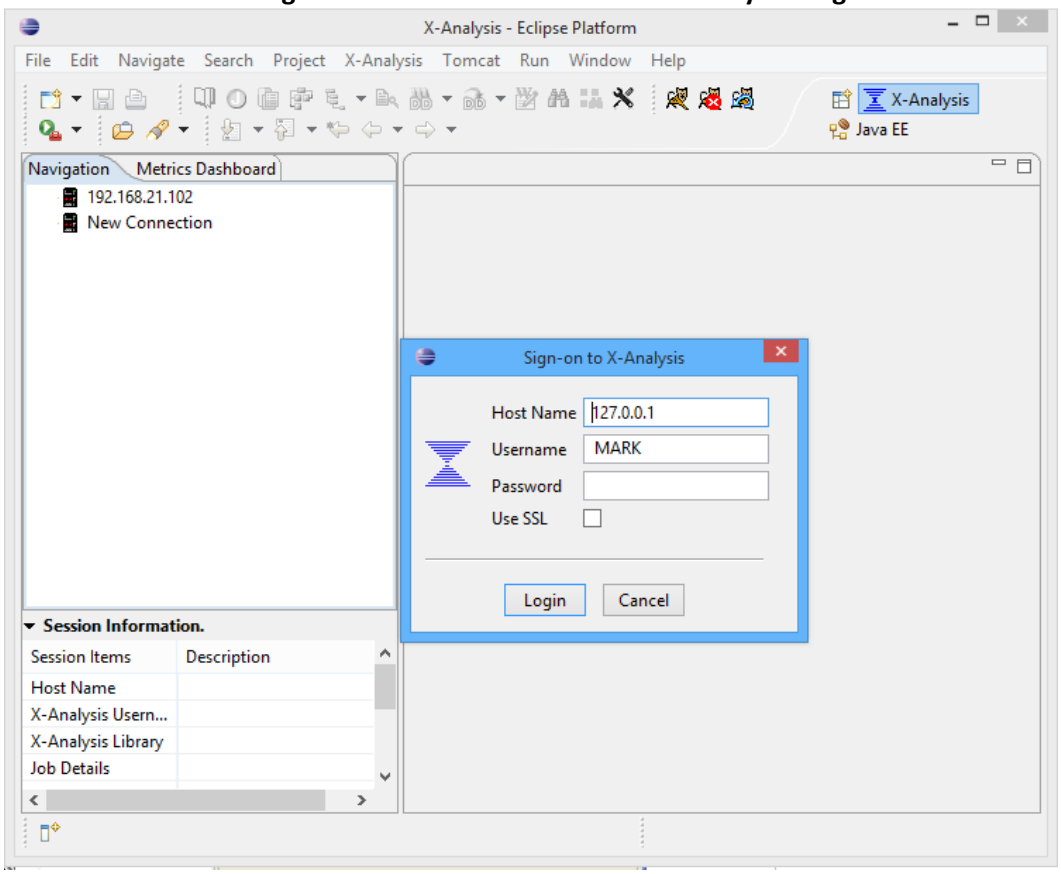
Creating New DB400 Connection from X-Analysis Plugin



New DB2 Connection

The X-Analysis menu provides the **New DB2 Connection** option. By selecting this option, you can create connections to use offline X-Analysis. Provide valid DB2 sign on information when selecting the **New DB2 Connection** option.

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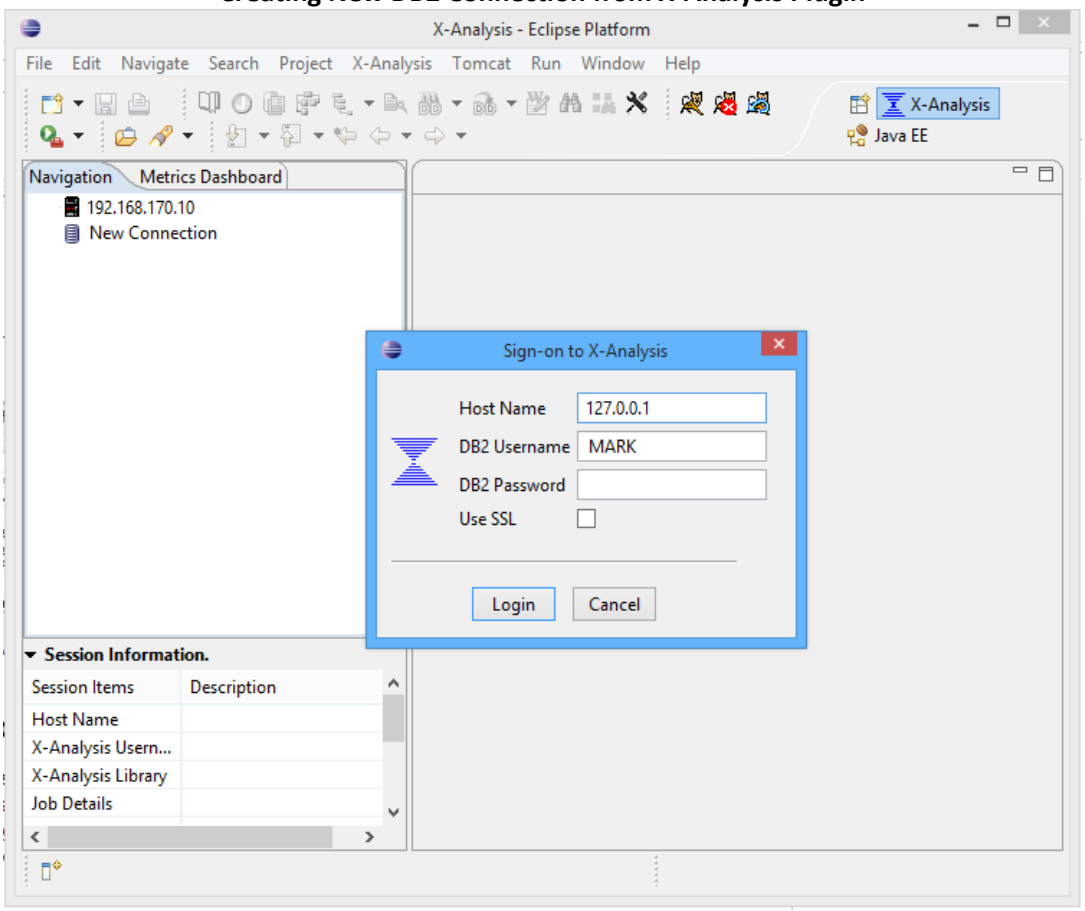
Creating New DB2 Connection from X-Analysis Plugin

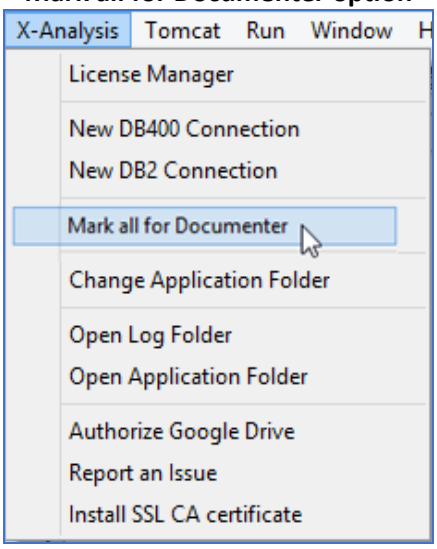


Refer to **Appendix A** for more details on X-Analysis Offline.

Mark all for Documenter

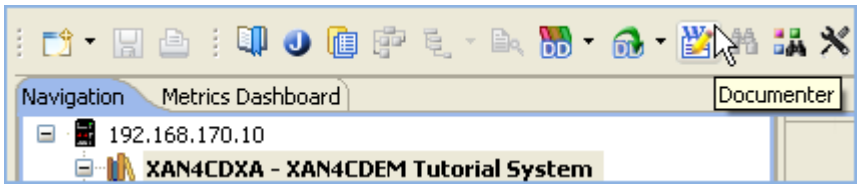
Select the **Mark all for Documenter** option to mark all records for system documentation which are listed on the X-Analysis window.

Mark all for Documenter option



You can view the marked records through the **Documenter** icon on toolbar.

Documenter icon



On clicking the **Documenter** icon, the **Document Manager** dialog will display all the marked records.

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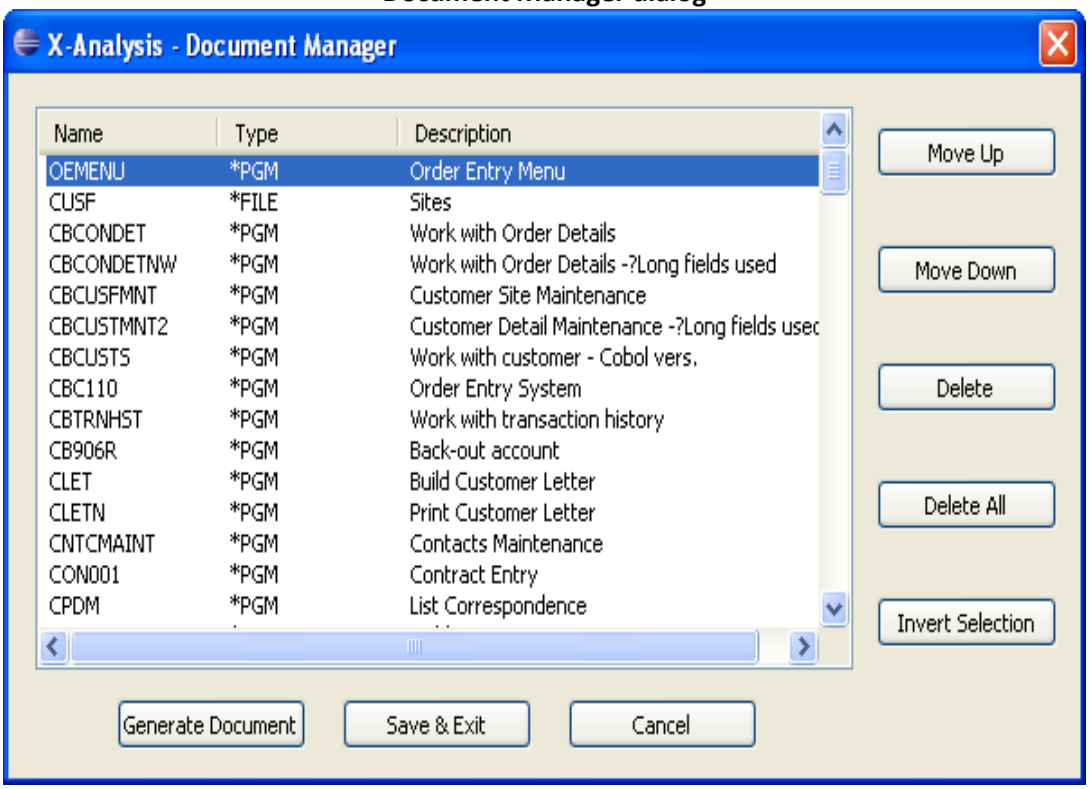
Document Manager dialog



Change Application Folder

The default **Application Folder** for a specific application can be changed by selecting the **Change Application Folder** option from the X-Analysis menu (**X-Analysis>Change Application Folder**). The following dialog appears on selecting this option:

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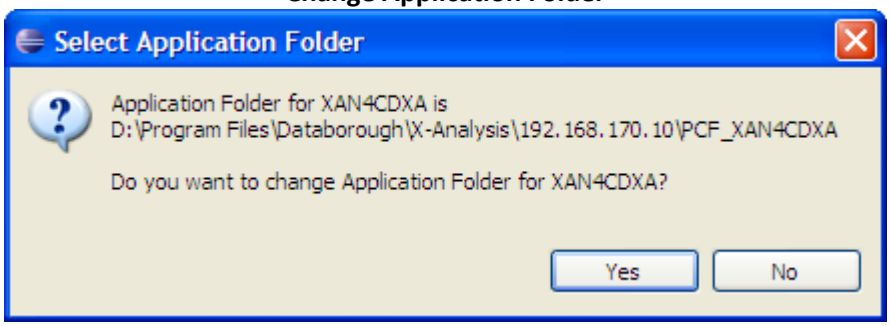
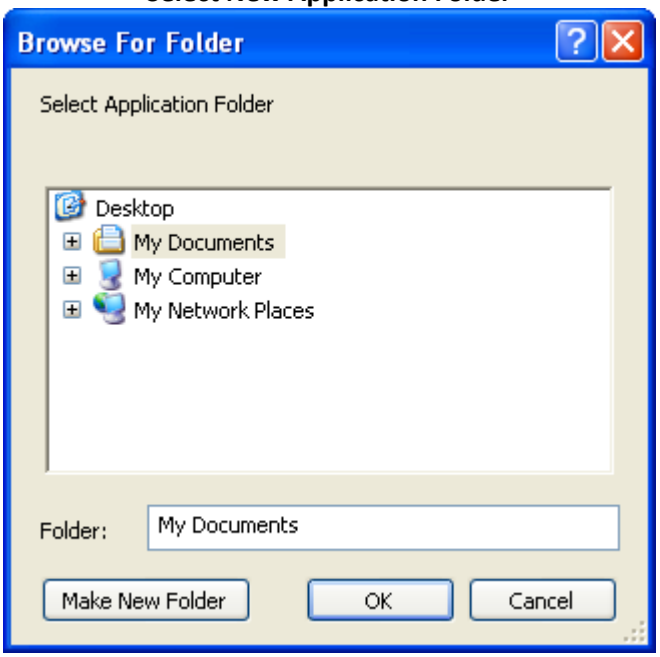
Change Application Folder



To select new Application Folder, click **Yes** in the dialog box. The following dialog appears prompting to specify location for the new Application Folder.

Select New Application Folder



Open Log Folder

This option opens the folder, currently used to record the log files of X-Analysis. The **XAPlugin.log** file can also be used for bug/error tracking. To choose this option, select the **Open Log Folder** option from the X-Analysis menu (**X-Analysis > Open Log Folder**).

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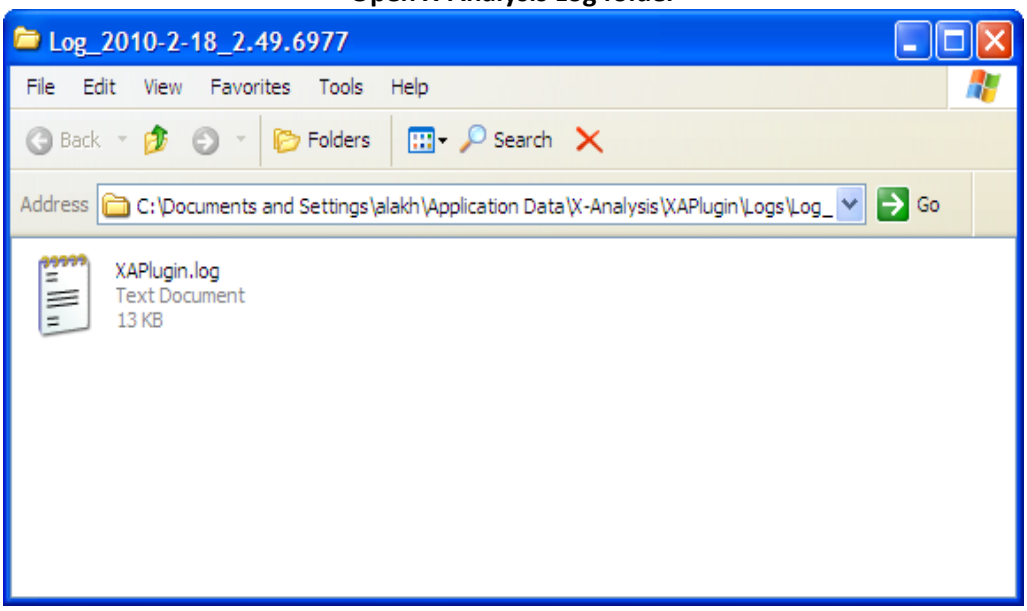
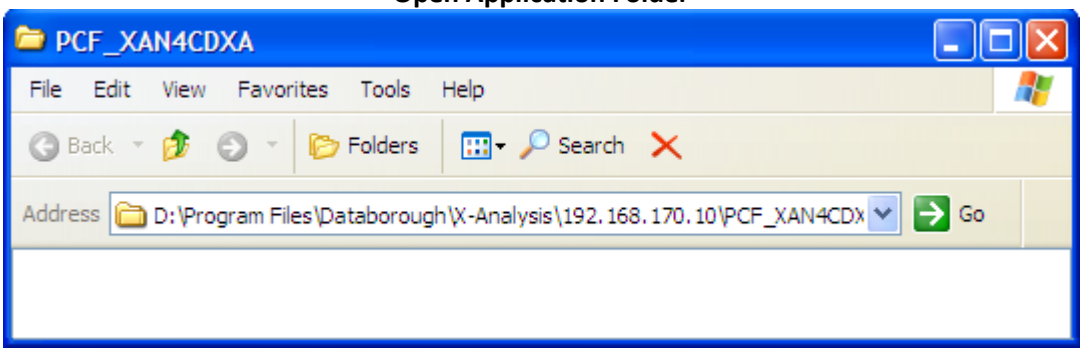
Open X-Analysis Log folder



Open Application Folder

Each application has its own Application Folder. This folder contains generated System Documents, Flowcharts, and DDL files. To view the Application Folder, select the **Open Application Folder** option from the X-Analysis menu (**X-Analysis > Open Application Folder**).

Open Application Folder



Authorize Google Drive

The **Authorize Google Drive** option authorizes you in exporting the DOCX or XLSX files to Google Drive. For more details, refer to **Appendix M**.

Report an Issue

The **Report an Issue** option helps you in reporting an issue along with the log files. When a user selects this option, X-Analysis collects all the information required to sort out the bug/error which is being reported and generates a zip file. X-Analysis then invokes the mail client installed on the user's system and attaches the zip file with this mail.

Install SSL CA certificate

The **Install SSL CA certificate** is meant for the user to allow him to transfer data in a convenient and secure manner. For more details, refer to **Appendix K**.

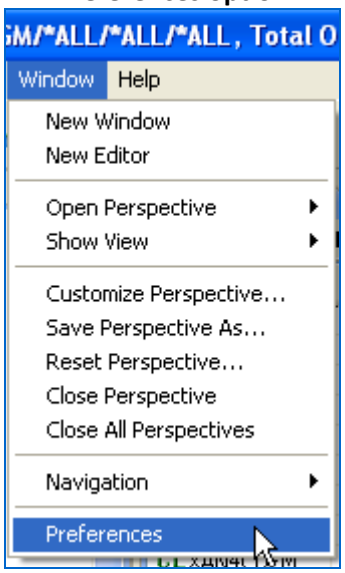
X-ANALYSIS PREFERENCES

The X-Analysis **Preferences** provides the facility to modify product preferences.

The X-Analysis Plugin comes with default preferences settings. You can change default preferences settings as required. To change preferences settings, open **IBM's Rational product 7.5** and above or **Eclipse 3.4** and above.

From the menu bar, select **Window > Preferences** to invoke the **Preferences** dialog.

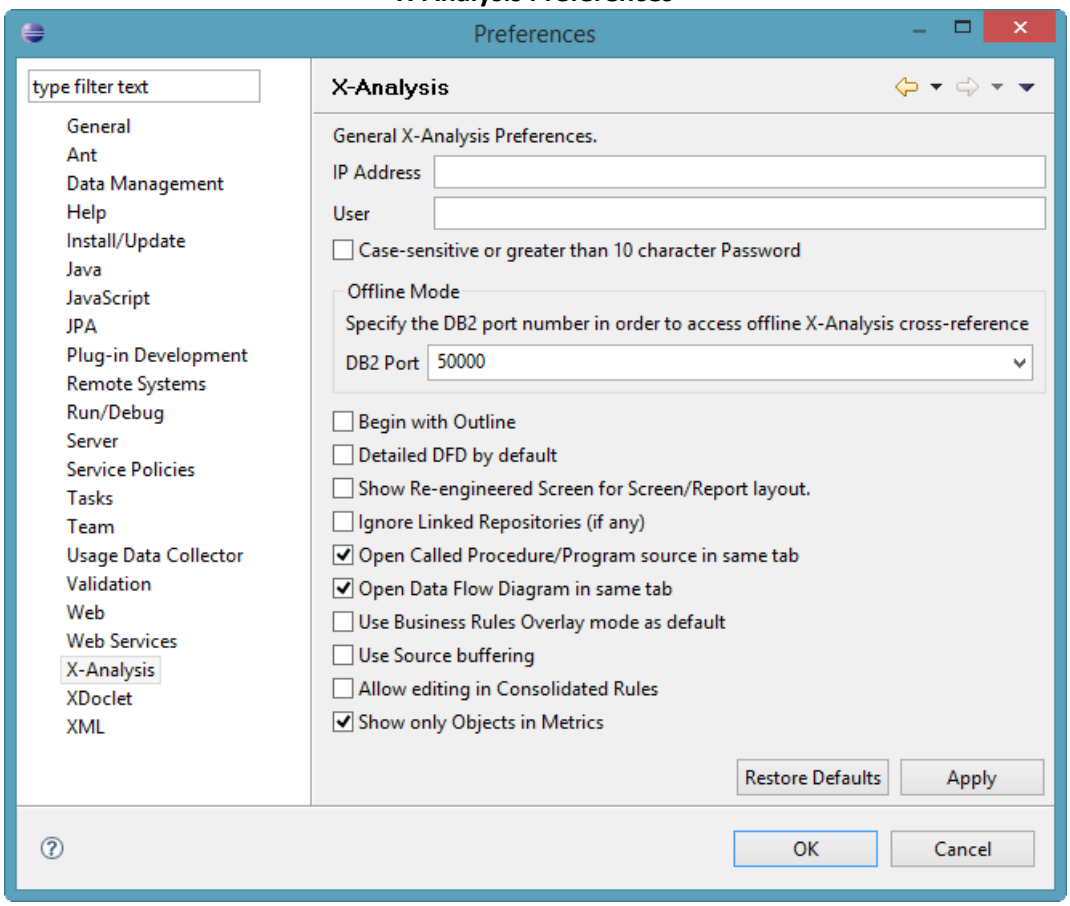
Preferences option



To view / modify various X-Analysis Preferences, select the **X-Analysis** node.

When you select the **X-Analysis** node, the following window is displayed:

X-Analysis Preferences



Here is a detailed look at the X-Analysis Preferences for the X-Analysis Plugin:

- **IP Address:** Specify the IP address of the IBM i on which the X-Analysis server components are installed.
- **User:** Specify the username to sign on to X-Analysis.
- **Case-sensitive Password:** If the IBM i server is configured for case-sensitive passwords, i.e. QPWDLVL is 2 or 3, and then check this option. For QPWDLVL on the IBM i as 0 or 1, leave it unchecked. The default option is checked.
- **DB2 Port:** Specify the port number for the DB2 instance, where DB2 services must be running. DB2 Port will be enabled on offline IP address i.e. 127.0.0.1 or localhost. The default DB2 port is 50000.
- **User Interface:** Specify language for the X-Analysis user interface. The default language is English.
- **Begin with Outline:** Specify appropriate settings for the Outline Pane (View Pane). The default option is unchecked, which means that the Outline Pane will not be

displayed automatically. The outline or any other view will be displayed only when asked for.

- **Detailed DFD by default:** Check this option to invoke detailed data flow diagram as default.
- **Show Re-engineered Screen for Screen/Report layout:** Check this option to view the re-engineered screen for Screen/Report layout. When not selected, the Screen/Report layout shows the green screen display. This is the default setting.
- **Ignore Linked Repositories (if any):** Check this feature to ignore linked repositories. The default option is unchecked.
- **Open Called Procedure/Program source in same tab:** Uncheck this option for not opening Called Procedure or program source in the same tab. The default option is checked.
- **Open Data Flow Diagram in same tab:** The default option is checked. Uncheck this box to force any DFD selected from within another Data Flow Diagram to open in a new editor. Currently such DFDs are drawn on the same editor.
- **Use Business Rules Overlay mode as default:** Check this option to set the Business Rules Overlay mode as default.
- **Use Source buffering:** Check this option to enable source buffering.
- **Allow editing in Consolidated Rules:** Check this option to make changes in the Consolidated Rules.
- **Show only Objects in Metrics window:** While listing metrics, when the relevant box is selected, then the metrics is shown for all items which actually have an object in the user's library(ies). When the box is left unselected, it also includes the source members which do not have any objects associated with it.

ADVANCED PREFERENCES

Expand the **X-Analysis** node to view/modify the **Advanced Preferences**.

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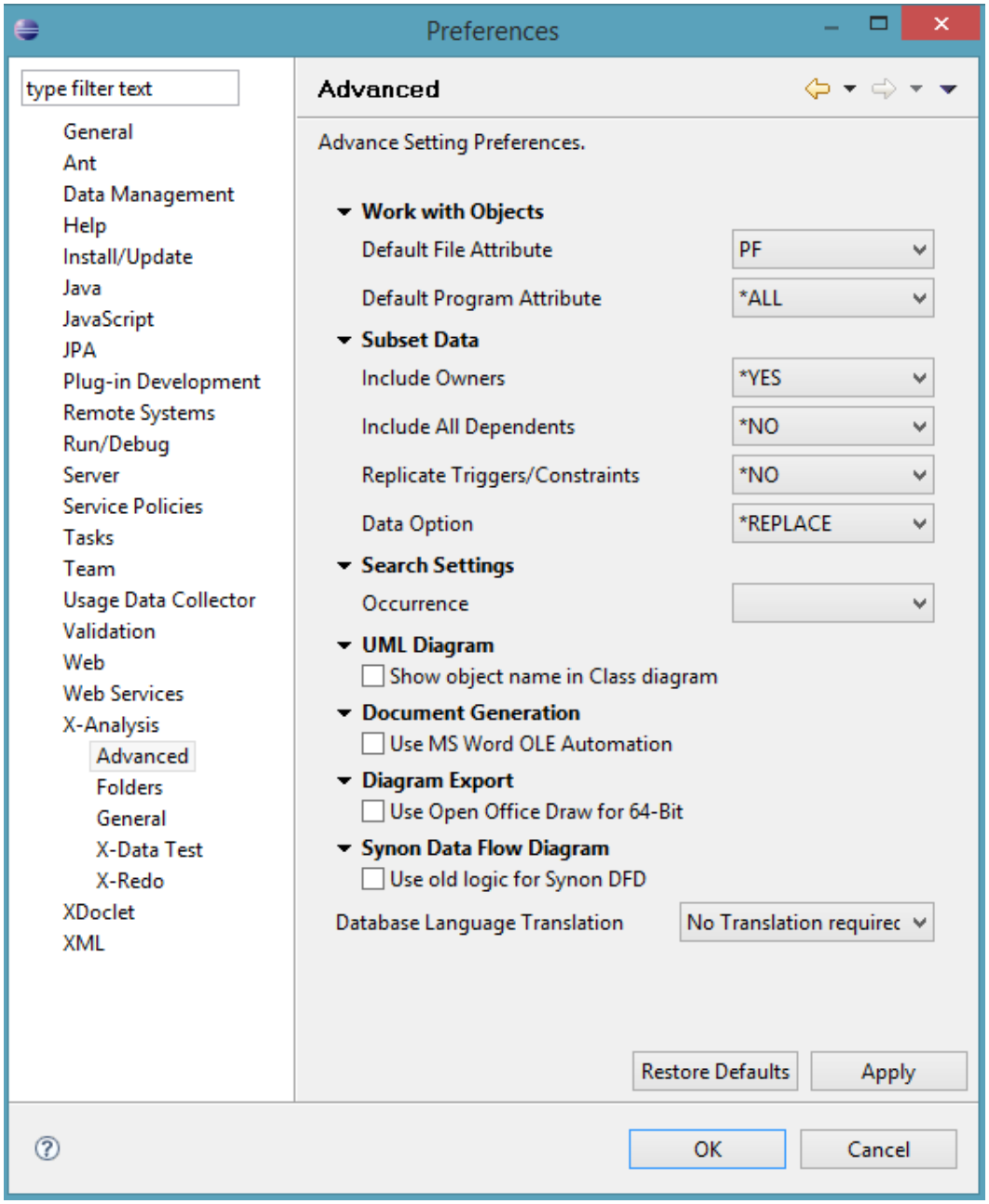
Advanced Preferences



You can modify the following Advanced Preferences for the X-Analysis Client:

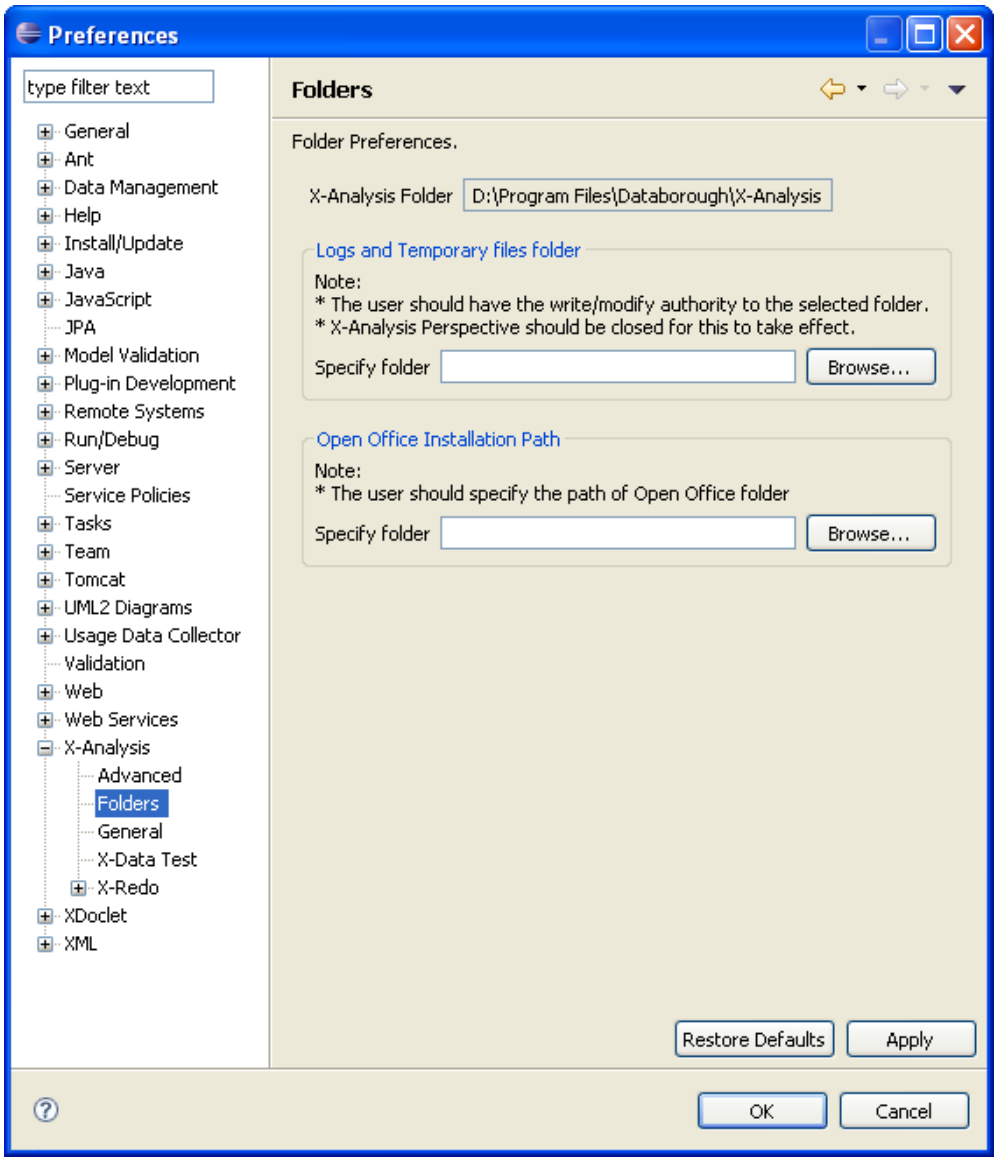
- **Work with Objects:**
  - **Default File Attribute:** Specify attribute for Object List of ***Files**. The default value is 'PF'.
  - **Default Program Attribute:** Specify attribute for Object List of ***PGM**. The default value is '*ALL'.

- **Subset Data:**
  - **Include Owners:** The default value is ***YES**.
  - **Include All Dependents**: The default value is ***NO**.
  - **Replicate Triggers/Constraints:** The default value is ***NO**.
  - **Data Option:** The default value is ***REPLACE**.
- **Search Settings:**
  - **Occurrence:** Select the appropriate search setting from the drop-down box. You will view the streamlined content based on this selection. If no selection is made, then the default search setting will apply.
- **UML Diagram:** Check the **Show object name in Class diagram** box to see the object name in the Class Diagram.
- **Document Generation:** The **Use MS Word OLE Automation** box is unchecked by default. Checking the box activates OLE Automation allowing greater flexibility in handling data during the document generation process.
- **Diagram Export:** The **Use Open Office Draw for 64-Bit** box is unchecked by default. Check the box to use Open Office Draw for exporting diagrams more efficiently in 64-bit machines. If the box is left unchecked, the diagrams will be exported in the default format.
- **Synon Data Flow Diagram:** When the **Use old logic for Synon DFD** box is checked, then the Synon DFD uses the older logic of reading the references from **X2EPGRF**. When the box is not checked, the new logic is used. In the latter case, you must have the latest server.
- **Database Language Translation:** This allows French users to select 'Database Translation Language', which enables correct display of French characters in the X-Analysis Client software.

FOLDERS PREFERENCES

Expand the **X-Analysis** node to view/modify the **Folders Preferences**.

Folders Preferences



- **Folder Preferences:**
  - **X-Analysis Folder:** Specify path for the X-Analysis folder.
- **Logs and Temporary files folder:**
  - **Specify Folder:** Specify location to change the default location for the X-Analysis logs and temporary files. If this is left blank, then default location is set.

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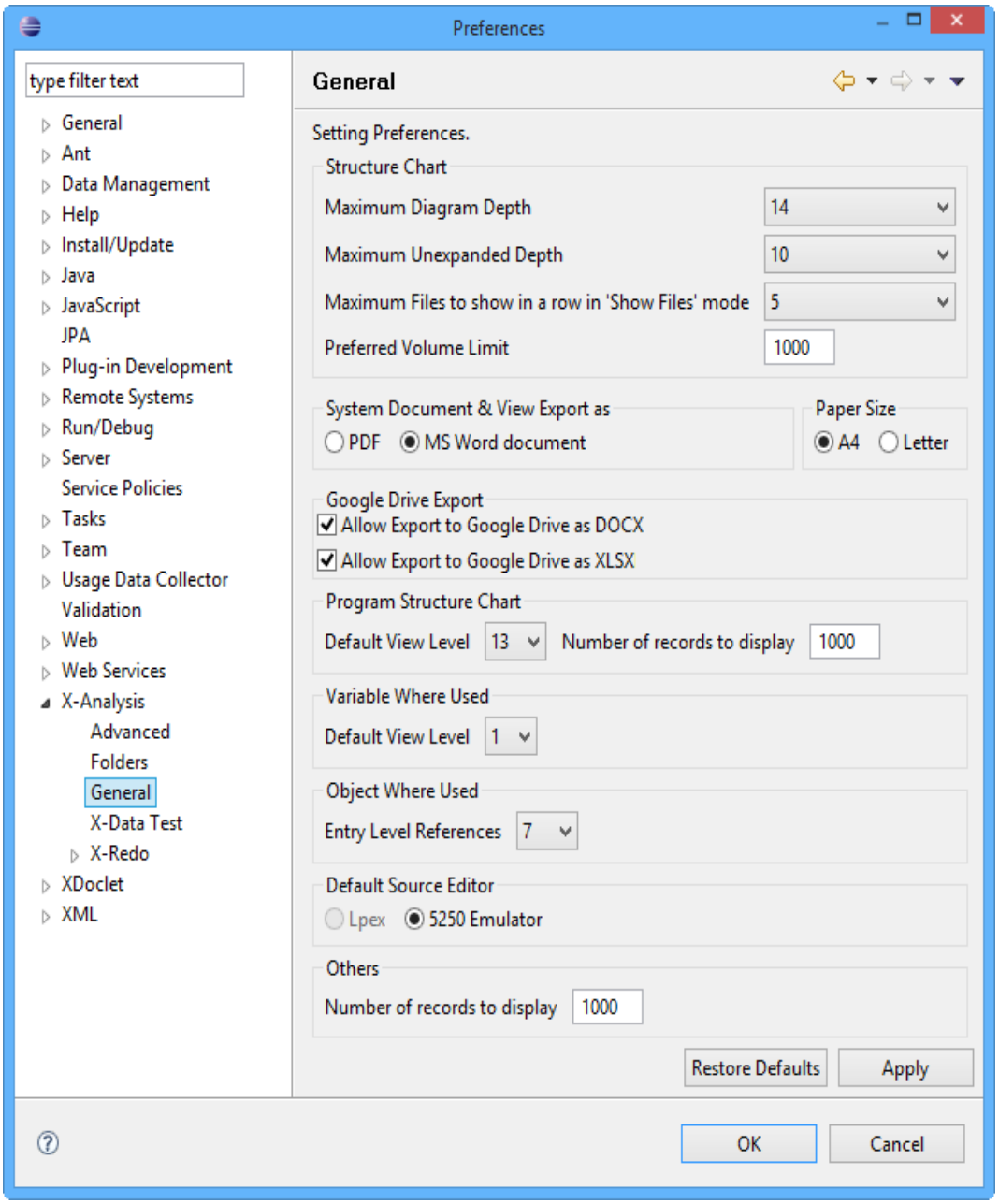
- **Open Office Installation Path:**
  - **Specify Folder:** Specify location to change the default Open Office Installation path. If this is left blank, then default location is set.

General Preferences

Expand the **X-Analysis** node to view/modify the **General Preferences**.

General Preferences



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- **Structure Chart**
  - **Maximum Diagram Depth:** The Interactive Structure Chart can be displayed up to 14 levels. Select appropriate level for the interactive Structure Chart. The default level is 14.
  - **Maximum Unexpanded Depth:** This sets the maximum depth up to which the SCD will be displayed as expanded. The data for further levels will be fetched, but shown as collapsed initially. The default level is 10.
  - **Maximum Files to show in a row in 'Show Files' mode:** The Interactive Structure Chart can display up to 10 files in a row. Select appropriate value for files to be displayed. Value ranges from 1-10. The default value is 5.
  - **Preferred Volume Limit:** The Interactive Structure Chart gets displayed according to the volume limit set / provided in this field. The default limit is 1000.
- **System Document & View Export as**
  - **PDF:** The **PDF** option is checked by default. It implies that System Document will be generated as PDF document. Also, all list/view/diagram exports will be as PDF.
  - **MS Word Document:** To generate System Documents in MS Word format, the user should choose this option. Also then all exports will be in MS Word document.
- **Paper Size**
  - **A4:** The **A4** option is checked by default. It implies that the print paper size will be A4.
  - **Letter:** Choose **Letter** as paper size for printing.
- **Google Drive Export**
  - **Allow Export to Google Drive as DOCX:** Check this option to allow Google Drive export in the DOCX format.
  - **Allow Export to Google Drive as XLSX:** Check this option to allow Google Drive export in the XLSX format.
- **Program Structure Chart**
  - **Default View Level:** Program Structure Chart can be displayed up to 20 levels. Select appropriate level. The default level is 13.
- **Variable Where Used**

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- **Default View Level:** Variable Where Used can be displayed up to 6 levels. Select appropriate level. The default level is 1.

- **Object Where Used**

  - **Entry Level References:** The Entry Level References need to gather information about calling program and then, in turn, calling program of calling program. This setting specifies the number of maximum recursions made while querying for the calling program. The default level is 7.

- **Default Source Editor**

  - **LPEX:** LPEX editor is checked by default for IBM Rational products having RSE plugin. It implies that the source member will be displayed in LPEX editor for editing purpose.

  - **5250 Emulator:** 5250 Emulator is the default option for non-RSE plugin. It implies that the source member will be displayed in a 5250 session for editing purpose.

- **Others**

  - **No. of records to display:** Displays the total number of records to be displayed in any *FILE object when the **View Data** option is executed.

X-DATA TEST PREFERENCES

Expand the **X-Data Test** node to view/modify the **X-Data Test Preferences**.

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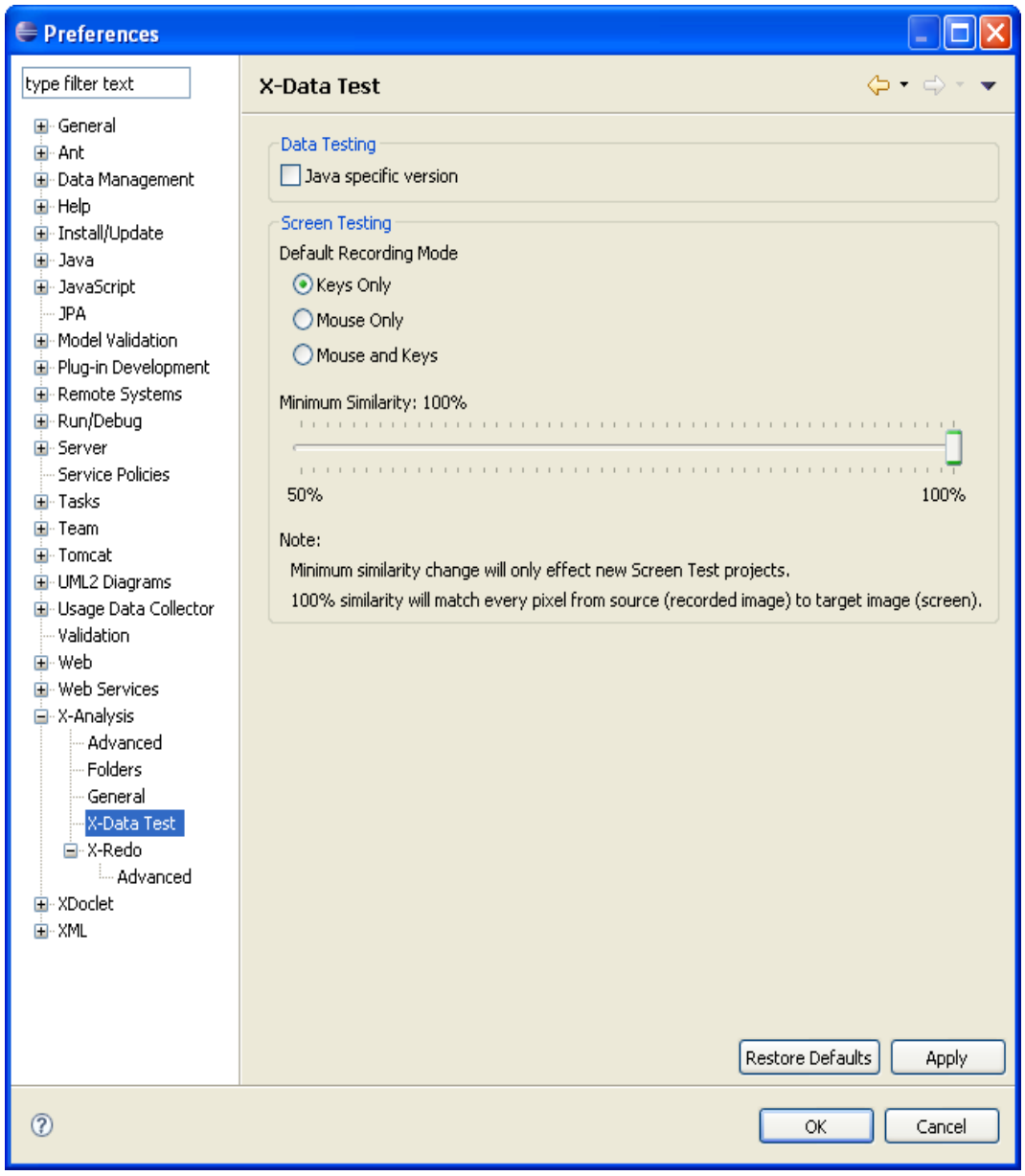
X-Data Test Preferences



You can modify the following **X-Data Test Preferences**:

- **Screen Testing**
  - **Default Recording Mode (Radio button):** Select one of the following methods:
    - **Keys Only:** Only entries by computer's keyboard are recorded.
    - **Mouse Only:** Only entries through computer's mouse are recorded.
    - **Mouse and Keys:** Both keyboard and mouse entries are recorded. This is the default option.

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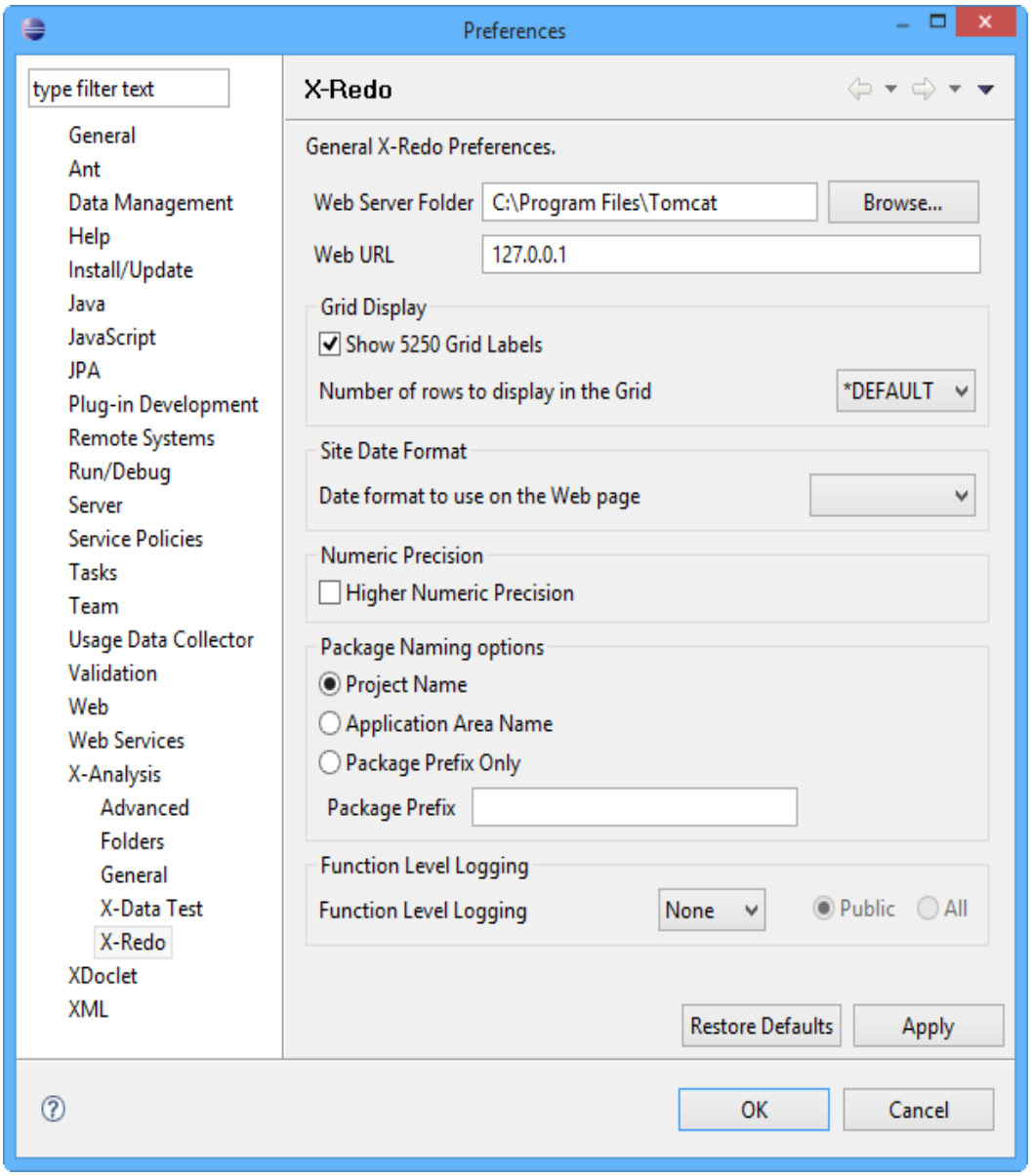
X-Redo Preferences

Expand the **X-Analysis** node to view/modify the **X-Redo Preferences**.

X-Redo Preferences



You can modify the following X-Redo Preferences:

- **Web Server Folder:** Specify the path for the Web Server folder. You may specify the Tomcat folder other than the one installed by X-Redo installer.
- **Web URL:** Specify the X-Redo URL for its execution. The default value is **127.0.0.1**. You may change the Tomcat port to use.

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- **Grid Display:** These configure the grid presentation.
    - **Show 5250 Grid Labels (Checkbox):** The default value is checked.
    - **No. of rows to display in the Grid (Drop-down):** This is used to set the default number of rows to display in a grid. The default value is ***DEFAULT**. The user can override the default rows to show by setting the number of rows to show on each grid.
- **Site Date Format:** This is used to set the default date format settings for the generated web pages. The user may select the required date format to use on the generated web pages to show and receive the dates.
- **Numeric Precision:**
    - **Higher Numeric Precision:** Selecting this option would use the BigDecimal data type instead of Double data type
- **Package Naming options (Radio button):**
    - **Project Name:** Name of the project as specified on the **Generate Programs** dialog (by default). This is used as the first part on the package names created in the project.
    - **Application Area Name:** If selected, the application area name is used as the first part on the package names created in the project.
    - **Package Prefix Only:** Selecting this option would only use the value in 'Package Prefix' as the prefix for the package name without appending Project/Application Area Name..
- **Function Level Logging:** This controls the logging statements to include on the generated code. By default '**None**' is set i.e. no logging. '**Trace**' includes the Entry and Exit statements into the '**Public**' functions (by default). Selecting '**Debug**' includes the statements to log values of the entry parameters when entering a '**Public**' function and their values when exiting the function. These are in addition to the Entry and Exit statements generated by the '**Trace**' option. For '**Trace**'/'**Debug**' mode, you may select '**All**' to log all the functions the control enters and exits at the runtime.

X-REDO ADVANCED PREFERENCES

Expand the **X-Redo** node to view/modify the **X-Redo Advanced Preferences**.

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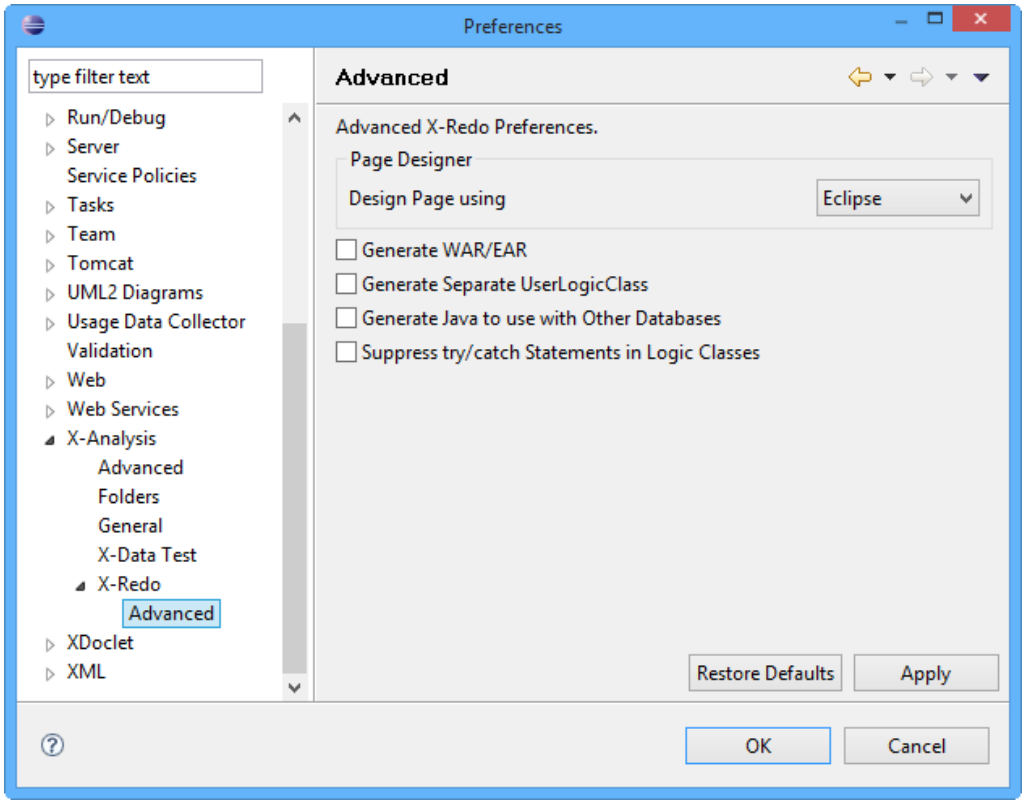
X-Redo Advanced Preferences



You can modify the following **X-Redo Advanced Preferences**:

- **Page Designer:** Option to design page using either **Eclipse** or **Dreamweaver**. By default, Eclipse is chosen.
- **Generate WAR/EAR:** When checked, this includes a right-click option **Generate WAR/EAR** on the X-Ref and application area.
- **Generate Separate UserLogicClass:** Check this option to generate separate UserLogicClass.
- **Generate Java to use with Other Databases:** Check this option to generate Java to use with the other databases.
- **Suppress try/catch Statements in Logic Classes:** Check this option to suppress try/catch statements in Logic Classes.

Preference changes will take effect for the new X-Analysis Instance.

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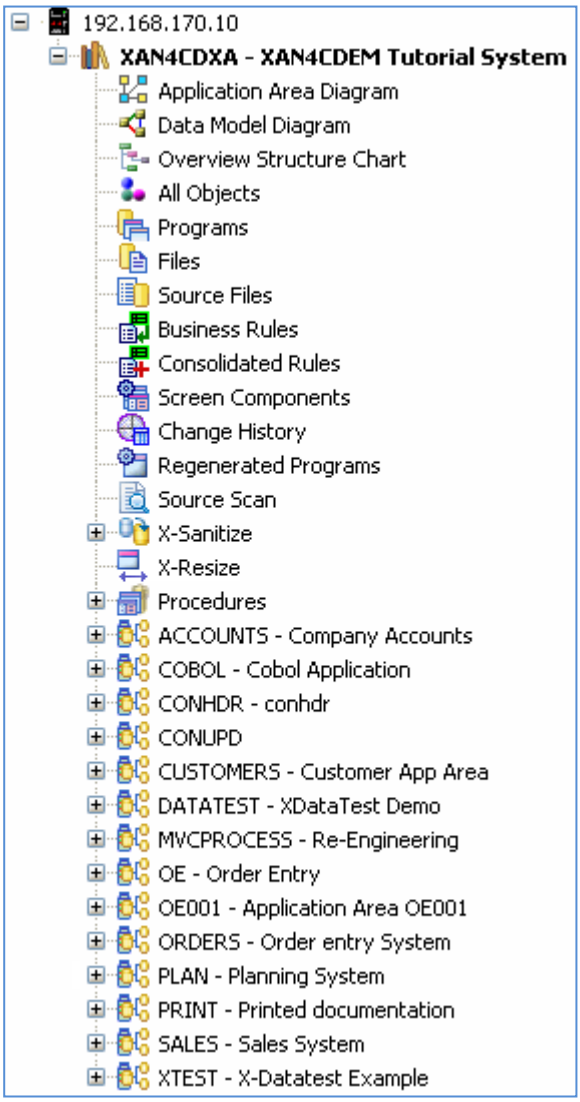
Application Library

Work with Application Libraries

The Application Libraries view is the first X-Analysis view. It lists all the applications added using the **X4WRKAPP** command.

Application Libraries view



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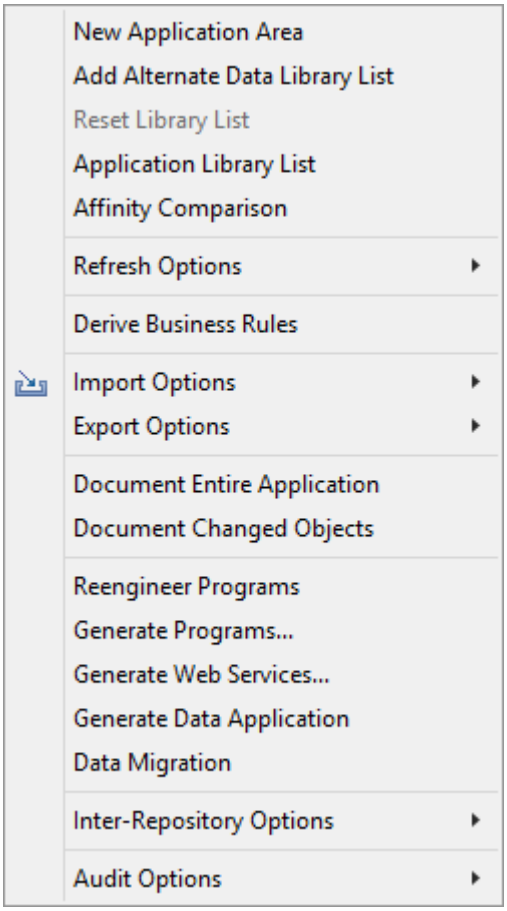
Application Library Menu Options

Select the cross-reference library and opt for the context menu which displays the following pop-up menu:

Context menu for the X-Ref



New Application Area

X-Analysis creates an application area from part of one or multiple systems. It is possible to programmatically subdivide an application into logical modules or areas. For more details, refer to the **Application Area** section.

Add Alternate Data Library List

The library list changes accordingly when you select a cross-reference library. This library list contains cross-reference library, data library, QGPL, QTEMP, and XAOBJ.

When you select the **View Data** option on a PF or LF, then data is displayed from the data library mentioned in the library list. If you want to use a data library other than the ones

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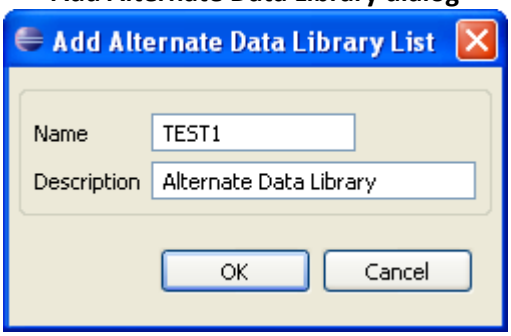
mentioned in the library list, then X-Analysis provides a feature called **Alternate Data Library List**.

The **Add Alternate Data Library List** option is available on the right-click menu of a cross-reference library. It provides a method of inserting a library or a group of libraries into the data portion of the library list. This gives a name to a group of libraries that can be maintained by the **Work with Alternate Data Library List** option, which is discussed below.

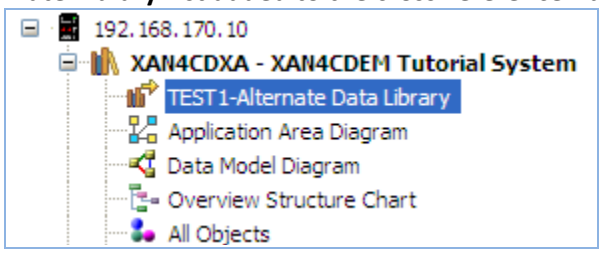
On selecting the **Add Alternate Data Library List** option, the following dialog appears:

Add Alternate Data Library dialog



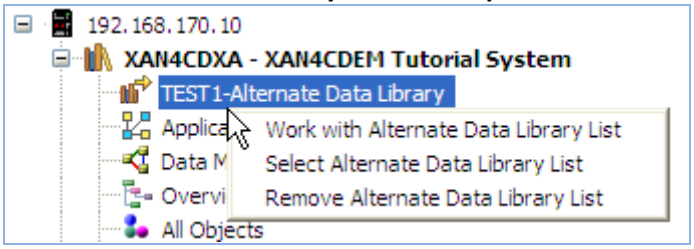
Provide a name and description for the alternate library group in the above dialog box. Click **OK** to add the alternate data library group name under the cross-reference library node, as shown below:

Alternate Library List added to the cross-reference library



Expand the cross-reference node and select the **Alternate Data Library** node. Then, opt for the context menu as displayed below:

Alternate Library List menu options



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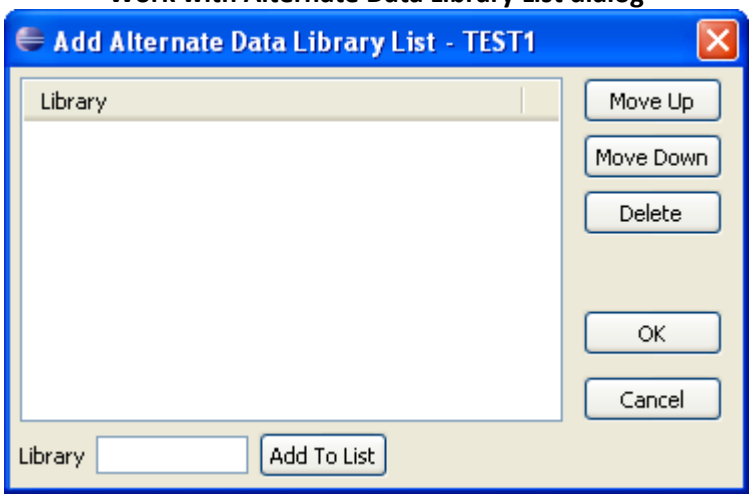
Add Data Library (ies) to the Alternate Data Library List

To add data library (ies), select the **Work with Alternate Data Library List** option from the right-click menu of the **Alternate Data Library List**. The **Work with Alternate Data Library List** invokes the following dialog:

Work with Alternate Data Library List dialog



Fill in the name of the data library as desired and click **Add To List**. This will add the data library in the **Library** section of the dialog. You can add more data libraries in the similar manner.

The **Work with Alternate Data Library List** dialog provides the following options for the libraries added:

- **Move Up** moves the specific library name to a higher position in the list.
- **Move Down** moves the specific library name to a lower position in the list.
- **Delete** removes the library name from the list.
- **OK** proceeds to the further process and closes the dialog box.
- **Cancel** closes the dialog box.

Select the Alternate Data Library List

The **Select Alternate Data Library List** option is used to select the Alternate Data Library. On selecting the **Alternate Data Library List**, the Library List is modified by replacing the Data Library from the user part of the Library List with Alternate Data Library/(ies) in the user part of Library List.

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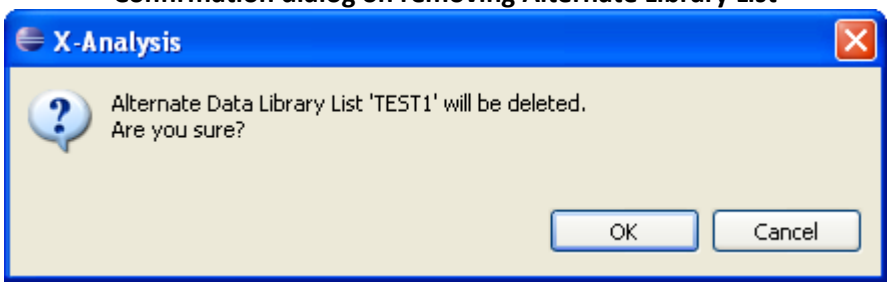
Remove Alternate Data Library List

Select the **Remove Alternate Data Library List** option to remove the Alternate Data Library from the cross-reference library. It will invoke the following confirmation dialog:

Confirmation dialog on removing Alternate Library List



Click **OK** to remove the Alternate Data Library. Click **Cancel** to cancel the option.

Reset Library List

When a cross-reference library is selected, the Library List changes accordingly. This Library List contains cross-reference library, data library, QGPL, QTEMP, and XAOBJ.

You can change this set of Library List by the help of the **Add Alternate Data Library List** option. Once the Alternate Data Library is set up, select the **Select Alternate Data Library List** option to modify the Library List of the cross-reference. If you want to use the previous Library List (original Library List at the time of cross-reference selection), select the **Reset Library List** option.

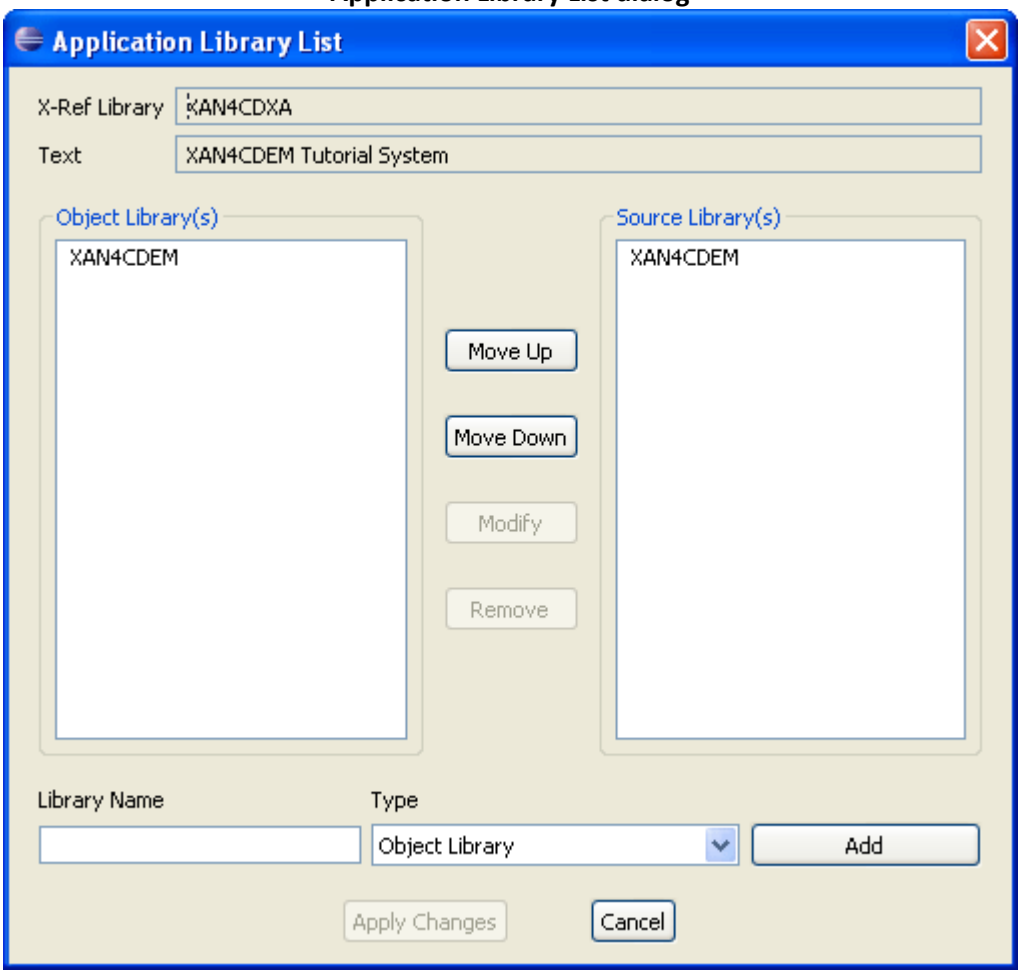
The **Reset Library List** option is available on the right-click menu of a cross-reference library. On selecting Reset Library List, the Library List is modified by removing the Alternate Data Library(ies) from the user part of the Library List and restoring the original Data Library(ies) to the user part of the Library List.

The Reset Library List option gets enabled only when the Select Alternate Data Library List option is selected from the right-click menu of the Alternate Data Library List.

Application Library List

The Application Library List is used to view/update the list of object and source libraries for the selected cross-reference. The facility is provided to allow you to add or remove any library or even change the sequence number. However, you need to re-initialize to see the effect after changing the application library list. To view/change the application libraries, opt for the context menu on the application library and select the **Application Library List** option. The following dialog is displayed:

Application Library List dialog



The **Application Library List** dialog displays the list of libraries for the selected cross-reference library. You can add new libraries to the existing cross-reference library list. Provide a valid library name in the **Library Name** text box. Then, choose the appropriate **Type** for the added library from the drop-down (it could be an object, a source, or a model library). After selecting the appropriate type for library, click **Add** to add the library to the existing library list. Re-initialize the cross-reference library to see the change.

Affinity Comparison

The **Affinity Comparison** option is allowed on the X-ref library as well as an application area.

The **Affinity Comparison** option at the X-Ref library displays all the objects belonging to one or more application areas along with the affinity comparison of those objects.

In the following window, the rows display the objects which exist on one or more application area, whereas the columns display the names of all the application areas belonging to the X-Ref library.

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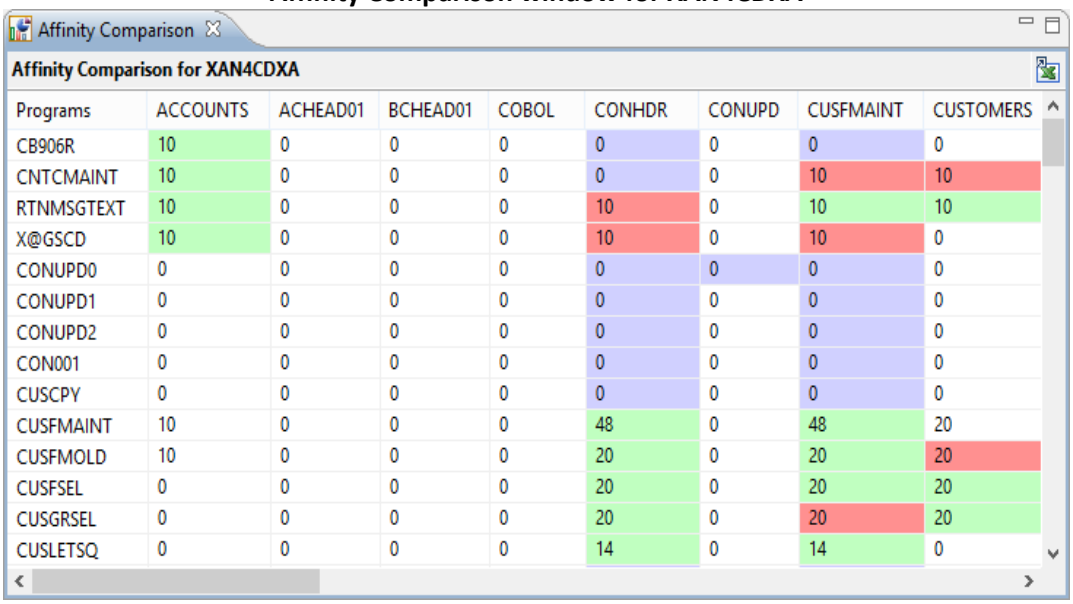
Affinity Comparison window for XAN4CDXA



Programs	ACCOUNTS	ACHEAD01	BCHEAD01	COBOL	CONHDR	CONUPD	CUSFMAINT	CUSTOMERS
CB906R	10	0	0	0	0	0	0	0
CNTCMAINT	10	0	0	0	0	0	10	10
RTNMSGTEXT	10	0	0	0	10	0	10	10
X@GSCD	10	0	0	0	10	0	10	0
CONUPD0	0	0	0	0	0	0	0	0
CONUPD1	0	0	0	0	0	0	0	0
CONUPD2	0	0	0	0	0	0	0	0
CON001	0	0	0	0	0	0	0	0
CUSCPY	0	0	0	0	0	0	0	0
CUSFMAINT	10	0	0	0	48	0	48	20
CUSFMOLD	10	0	0	0	20	0	20	20
CUSFSEL	0	0	0	0	20	0	20	20
CUSGRSEL	0	0	0	0	20	0	20	20
CUSLETSQ	0	0	0	0	14	0	14	0

REFRESH OPTIONS

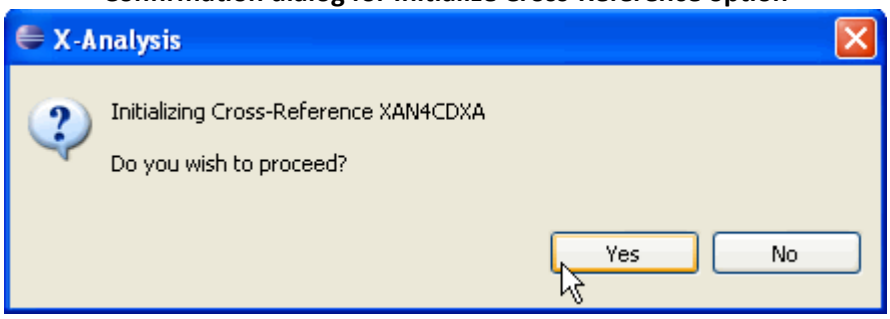
The submenu has the following options:

- Initialize Cross-Reference
- Refresh Cross-Reference
- Rebuild Data Model
- Repository Refresh Log

Initialize Cross-Reference

The **Initialize Cross-Reference** option initializes the cross-reference library to reflect the changes that have been made to the cross-reference library. This option is available under the **Refresh Options** submenu on the context menu of the cross-reference library. The following dialog is displayed on selecting this option:

Confirmation dialog for Initialize Cross-Reference option



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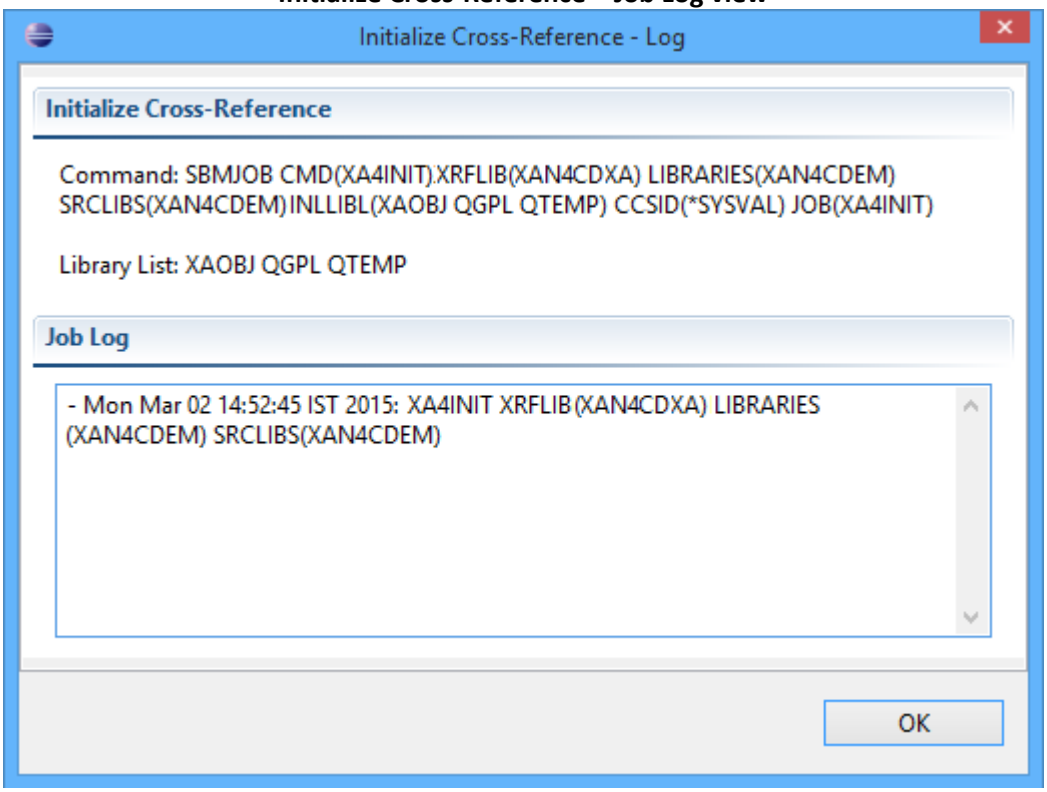
Click **Yes** to submit a new batch job for initializing the cross-reference library.

The batch job processing on the server is displayed as shown below:

Initialize Cross-Reference – Job Log view


Initialize Cross-Reference - Log
Initialize Cross-Reference
Command: SBMJOB CMD(XA4INIT)XRFLIB(XAN4CDXA) LIBRARIES(XAN4CDEM) SRCLIBS(XAN4CDEM)INLLIBL(XAOBJ QGPL QTEMP) CCSID(*SYSVAL) JOB(XA4INIT)
Library List: XAOBJ QGPL QTEMP
Job Log
- Mon Mar 02 14:52:45 IST 2015: XA4INIT XRFLIB(XAN4CDXA) LIBRARIES (XAN4CDEM) SRCLIBS(XAN4CDEM)
OK

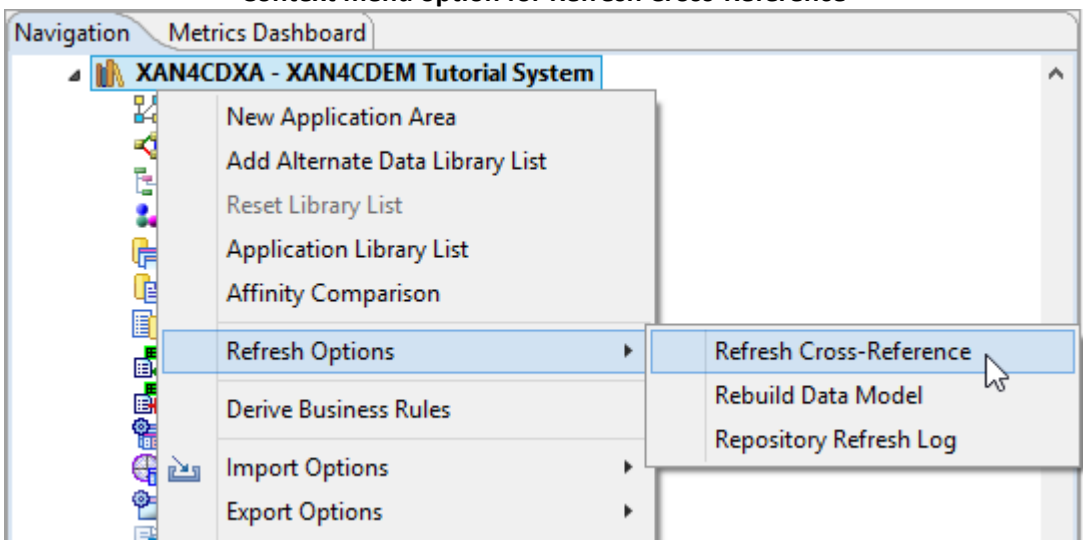
Note: The Initialize Cross-Reference option gets enabled only for the new cross-reference application.

Refresh Cross-Reference

The **Refresh Cross-Reference** option refreshes the cross-reference library to reflect any changes that have been made to the cross-reference library. This option only refreshes the sources and objects that have already been initialized; it will not look at freshly-added or deleted sources and objects.

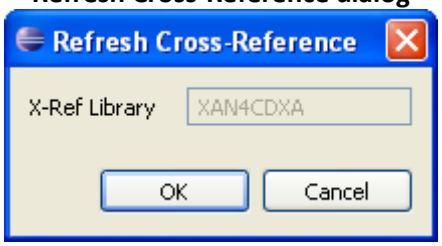
The **Refresh Cross-Reference** library option is available under the **Refresh Options** submenu on the context menu of the cross-reference library.

Context menu option for Refresh Cross-Reference



On selecting this option, the following dialog is displayed:

Refresh Cross-Reference dialog



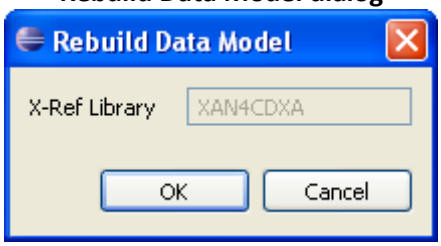
Click **OK** to execute a batch job and refresh the cross-reference for any changes.

This action locks X-Analysis Plugin. After the Refresh process is over, the lock on X-Analysis Plugin is released.

Rebuild Data Model

Select the **Rebuild Data Model** option to bring up the **Rebuild Data Model** dialog.

Rebuild Data Model dialog



Click **OK** to unselect the application and submits the modelling command in batch mode. The process locks the application.

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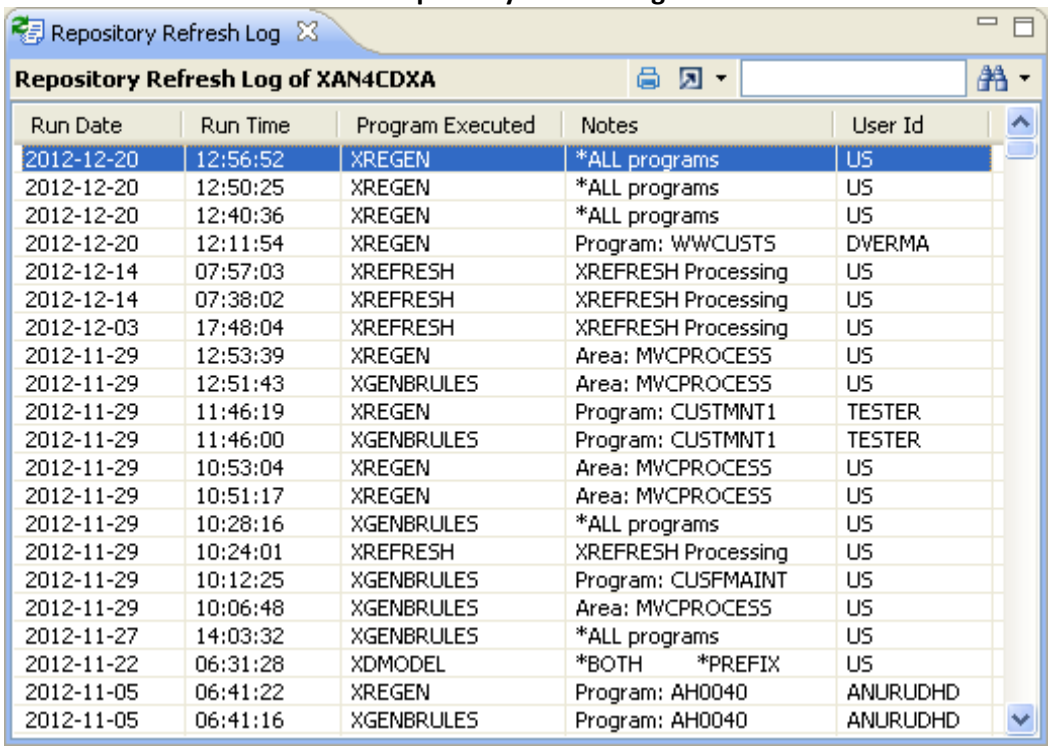
Repository Refresh Log

The **Repository Refresh Log** option displays list of commands which were executed over the selected cross-reference library. The option is available under the **Refresh Options** submenu on the context menu of the cross-reference library. Select this option to display the following window:

Repository Refresh Log



Run Date	Run Time	Program Executed	Notes	User Id
2012-12-20	12:56:52	XREGEN	*ALL programs	US
2012-12-20	12:50:25	XREGEN	*ALL programs	US
2012-12-20	12:40:36	XREGEN	*ALL programs	US
2012-12-20	12:11:54	XREGEN	Program: WWCUSTS	DVERMA
2012-12-14	07:57:03	XREFRESH	XREFRESH Processing	US
2012-12-14	07:38:02	XREFRESH	XREFRESH Processing	US
2012-12-03	17:48:04	XREFRESH	XREFRESH Processing	US
2012-11-29	12:53:39	XREGEN	Area: MVCPROCESS	US
2012-11-29	12:51:43	XGENBRULES	Area: MVCPROCESS	US
2012-11-29	11:46:19	XREGEN	Program: CUSTMNT1	TESTER
2012-11-29	11:46:00	XGENBRULES	Program: CUSTMNT1	TESTER
2012-11-29	10:53:04	XREGEN	Area: MVCPROCESS	US
2012-11-29	10:51:17	XREGEN	Area: MVCPROCESS	US
2012-11-29	10:28:16	XGENBRULES	*ALL programs	US
2012-11-29	10:24:01	XREFRESH	XREFRESH Processing	US
2012-11-29	10:12:25	XGENBRULES	Program: CUSFMAINT	US
2012-11-29	10:06:48	XGENBRULES	Area: MVCPROCESS	US
2012-11-27	14:03:32	XGENBRULES	*ALL programs	US
2012-11-22	06:31:28	XDMODEL	*BOTH *PREFIX	US
2012-11-05	06:41:22	XREGEN	Program: AH0040	ANURUDHD
2012-11-05	06:41:16	XGENBRULES	Program: AH0040	ANURUDHD

The log contains information about the user who executed a command and its date and time details. Only the following commands were reported:

- Application Initialisation (**XA4INIT**)
- Data Model Generation (**XDMODEL**)
- Business Rules Extraction (**XGENBRULES**)
- X-Resize Initialisation (**XRESIZE**)
- Application Refresh (**XREFRESH**)

Derive Business Rules

The **Derive Business Rules** option is available on the context menu over the application library, an application area, and on an individual ***PGM** type object of **RPG**/**RPGLE** or **CBL** attribute. For more details, refer to the Business Rules Analysis section.

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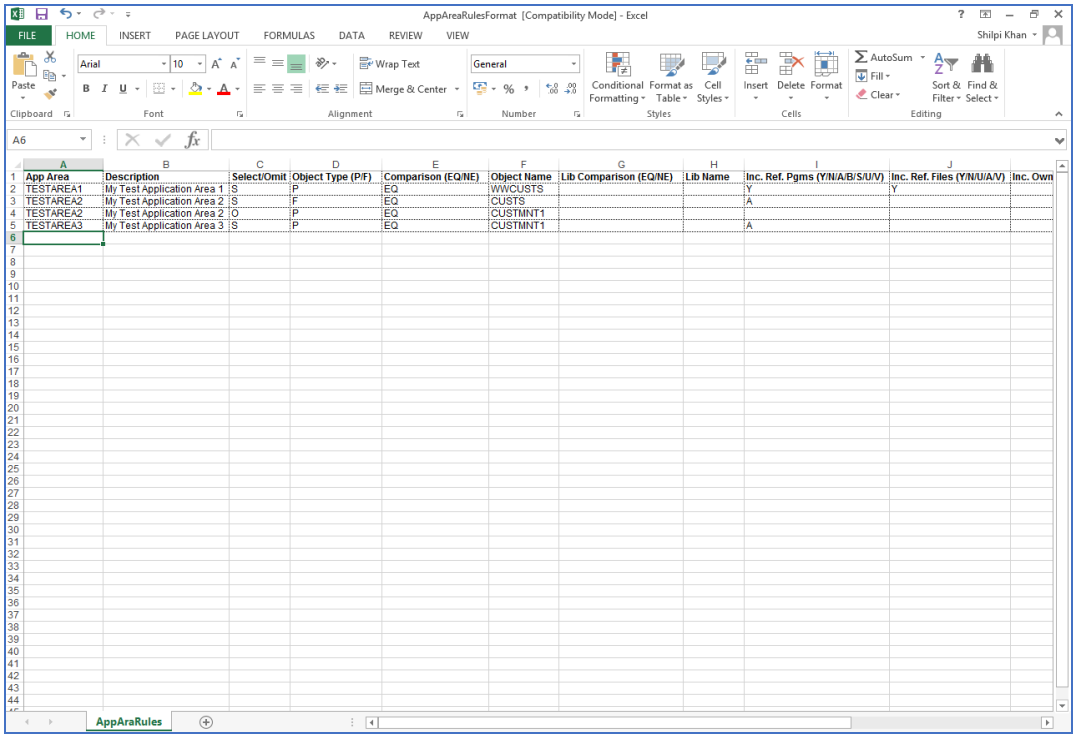
IMPORT OPTIONS

The **Import Options** submenu has the **Application Area using Excel Sheet** as the only option. Selecting the option will open a dialog box to browse the Excel document in a pre-defined format. The image of the format is shown below:

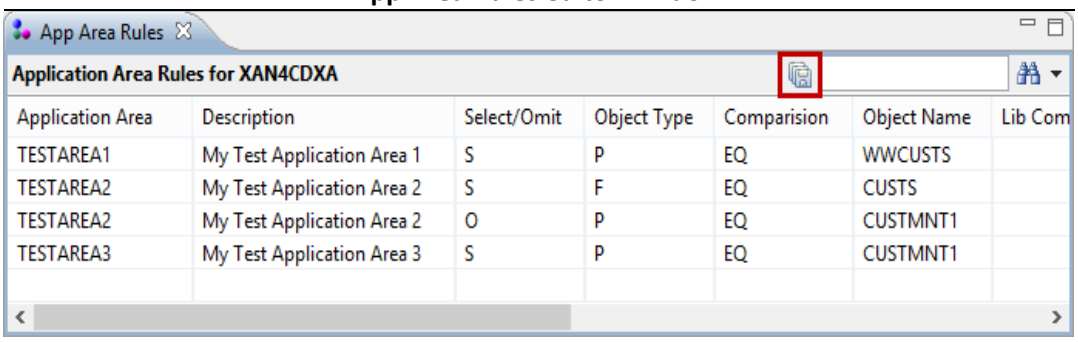
Excel sheet – Pre-defined format



App Area	Description	Select/Omit	Object Type (P/F)	Comparison (EQ/NE)	Object Name	Lib Comparison (EQ/NE)	Lib Name	Inc. Ref. Pgms (Y/N/A/B/S/U/V)	Inc. Ref. Files (Y/N/U/A/V)	Inc. Own
TESTAREA1	My Test Application Area 1	S	P	EQ	WWCUSTS			Y	Y	
TESTAREA2	My Test Application Area 2	S	F	EQ	CUSTS			A		
TESTAREA2	My Test Application Area 2	O	P	EQ	CUSTMNT1					
TESTAREA3	My Test Application Area 3	S	P	EQ	CUSTMNT1			A		

The data loaded from the Excel document can be viewed in the Application Area Rules editor window on Eclipse as is shown in the following image:

App Area Rules editor window



Application Area	Description	Select/Omit	Object Type	Comparision	Object Name	Lib Com
TESTAREA1	My Test Application Area 1	S	P	EQ	WWCUSTS	
TESTAREA2	My Test Application Area 2	S	F	EQ	CUSTS	
TESTAREA2	My Test Application Area 2	O	P	EQ	CUSTMNT1	
TESTAREA3	My Test Application Area 3	S	P	EQ	CUSTMNT1	

Delete the entries by right-clicking on the required row and save the changes by clicking the **Save** icon marked in the above image.

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Note: The pre-defined format for the Excel sheet is available in the 'template' folder on the location where X-Analysis is installed.

EXPORT OPTIONS

This submenu has the following options:

- Export as DDL
- Export as Web Query Metadata
- Export as Web Query Application
- Export Business Rules as XML
- Convert DDS to SQL
- Generate Database Service Programs
- Export CRUD Spreadsheet (available only for application areas)

Export as DDL

The **Export as DDL** option exports Data Model information as Data Definition Language to the application folder. This information may be used by any database management system e.g. Oracle or SQL server to create a similar data model. For details, refer to the Export as DDL from X-Analysis section.

Export as Web Query Metadata

The Web Query Metadata files are generated using the **XWBQMET** command. These files can be used in IBM's DB2 Web Query Tool.

Export as Web Query Application

The Web Query Report files are generated using the **XWBQRPT** command. These files can be used in IBM's DB2 Web Query Tool.

Export Business Rules as XML

The **Export Business Rules as XML** option generates an XML file which details all the business rules of the selected application/application area. The following dialog is displayed when this option is selected:

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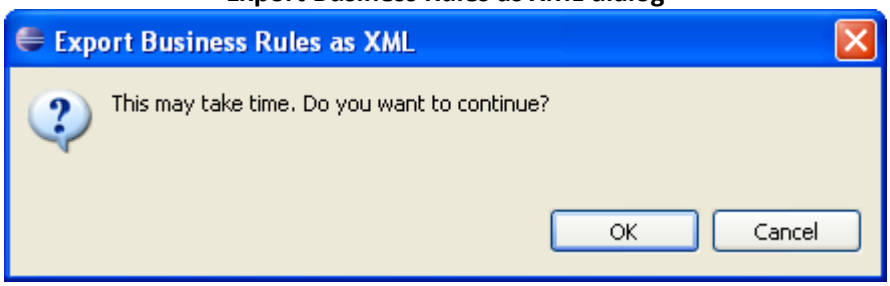
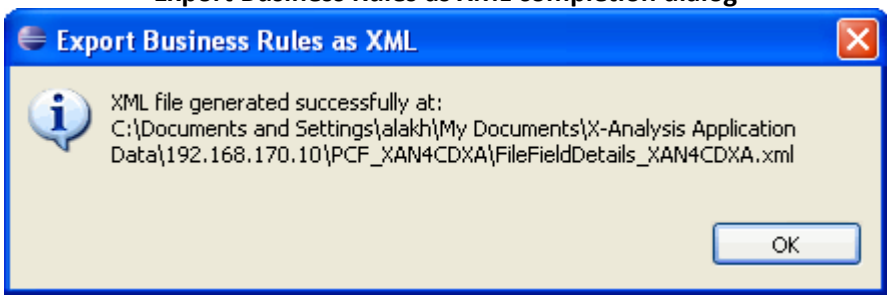
Export Business Rules as XML dialog



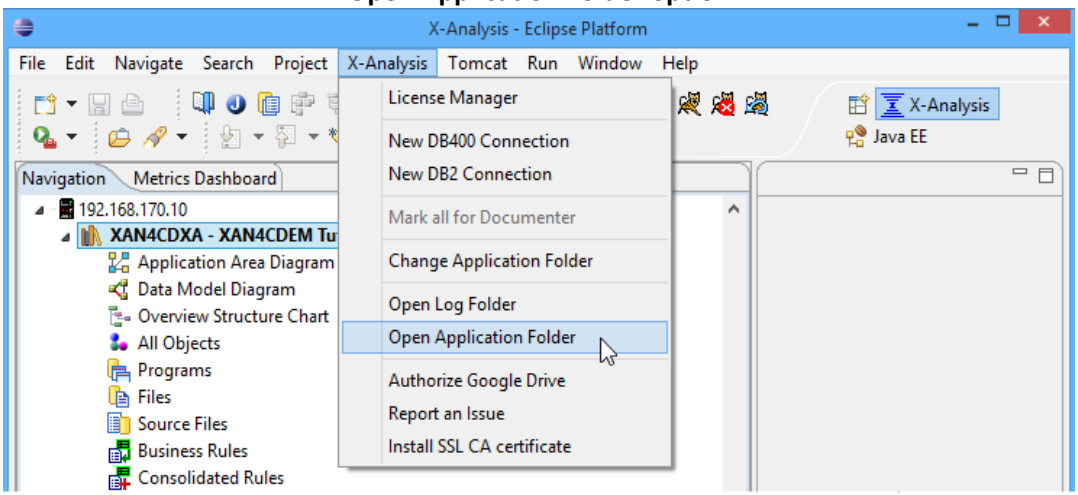
When the processing is complete, the following information dialog is displayed:

Export Business Rules as XML completion dialog


Export Business Rules as XML
XML file generated successfully at:
C:\Documents and Settings\alakh\My Documents\X-Analysis Application Data\192.168.170.10\PCF_XAN4CDXA\FileFieldDetails_XAN4CDXA.xml
OK

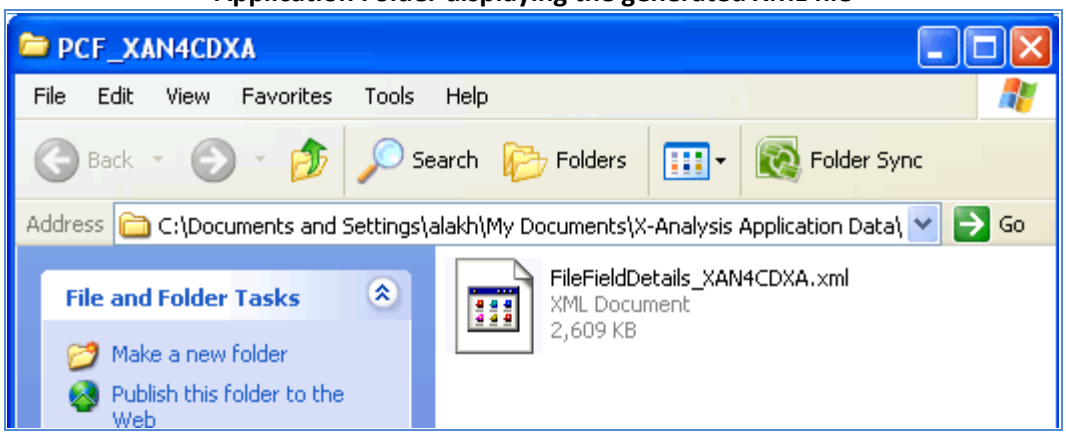
To view the generated XML file, open the application folder as displayed below:

Open Application Folder option



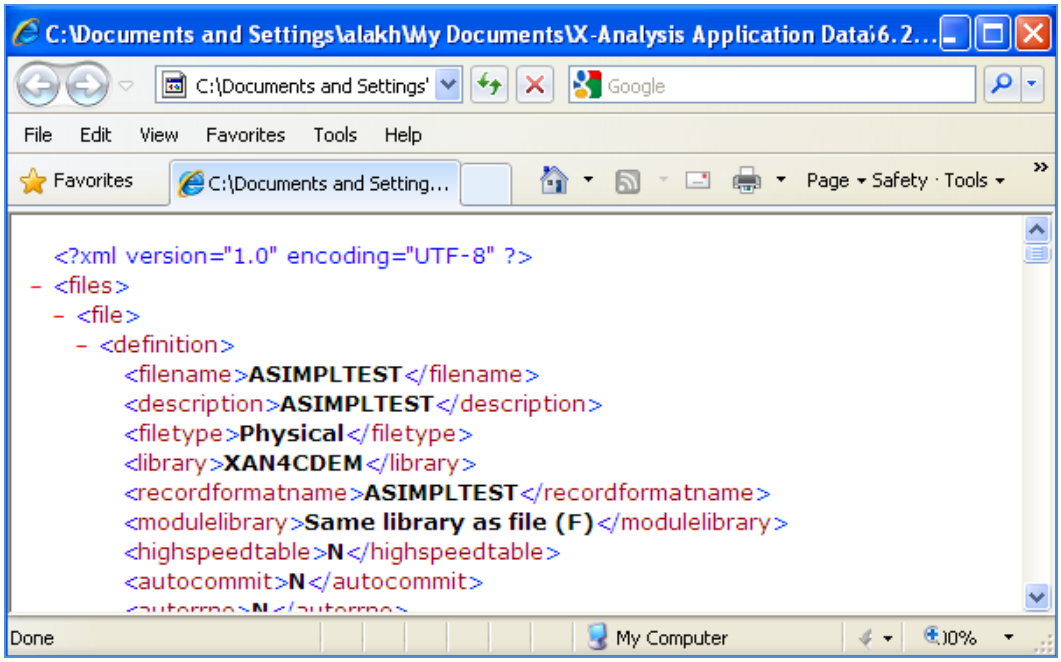
The following screen displays the Application Folder listing the generated XML file.

Application Folder displaying the generated XML file



Open the generated XML file in Internet Explorer or any other suitable editor.

Generated XML File



Convert DDS to SQL

The **Convert DDS to SQL** option calls the **XDDSTOSQL** IBM i command and submits the job in batch. For details, refer to the Convert DDS to SQL section.

Generate Database Service Programs

The **Generate Database Service Programs** option calls the **XWRTDBSP** IBM i command and submits the job in batch. For details, refer to the Generate Database Service Programs section.

Document Entire Application

Refer to the Document Manager section.

Document Changed Objects

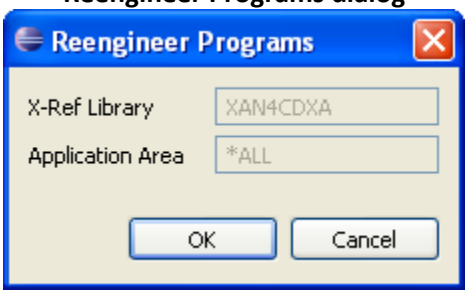
The **Document Changed Objects** option documents those objects which have changed since the last initialization was run on the cross-reference library. This option is available on the context menu of the application library. For more details, refer to the Document Manager section.

Reengineer Programs

The **Reengineer Programs** option submits a batch job which performs the two tasks – Reengineering and Service Modules generation. The batch command (**XREGENS**) performs the reengineering of the client programs in such a way that the old code in RPG/RPGLE free/fixed format gets converted into free format procedure-based module. It does not change the structure of the program. The subroutines are converted into procedures.

The **Reengineer Programs** option is available on the context menu of application library and application areas. This option is also available on individual ***PGM** type object, under the **Modernization Options** submenu. The following dialog is displayed when you select this option:

Reengineer Programs dialog



Click **OK** to submit a batch job. A **Job Log** dialog is displayed which interactively and independently displays the batch job status.

The following window displays the progress of the batch job.

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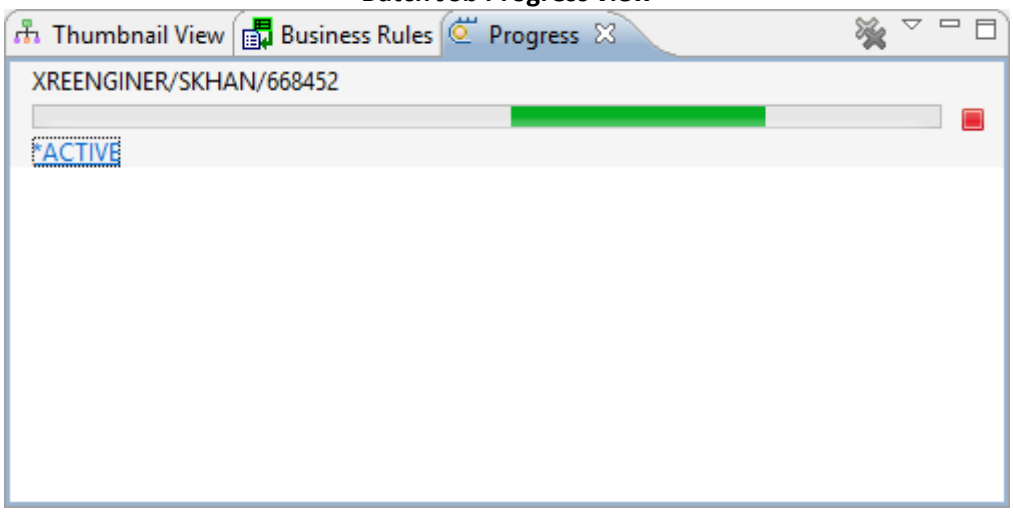
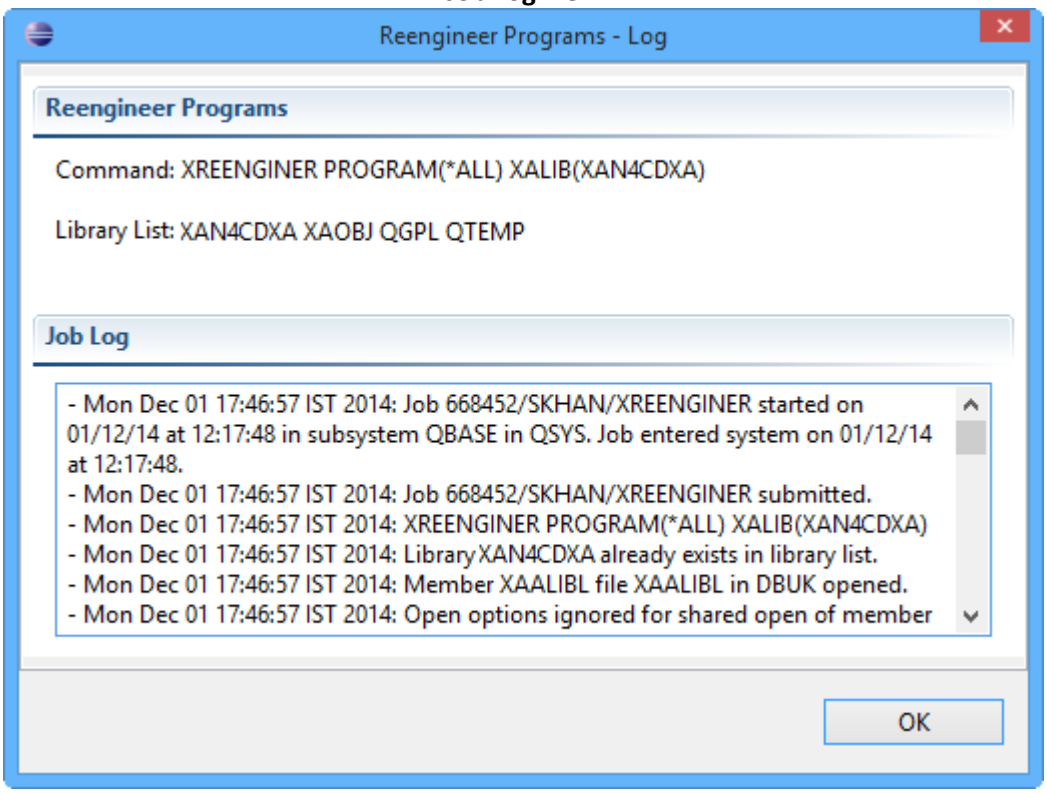
Batch Job Progress view



At any point, while the batch job is running, click on the hyperlink (***ACTIVE**) to view the Job Log. The Job Log view is shown below:

Job Log view


Reengineer Programs - Log
Reengineer Programs
Command: XREENGINER PROGRAM(*ALL) XALIB(XAN4CDXA)
Library List: XAN4CDXA XAOBJ QGPL QTEMP
Job Log
- Mon Dec 01 17:46:57 IST 2014: Job 668452/SKHAN/XREENGINER started on 01/12/14 at 12:17:48 in subsystem QBASE in QSYS. Job entered system on 01/12/14 at 12:17:48.
- Mon Dec 01 17:46:57 IST 2014: Job 668452/SKHAN/XREENGINER submitted.
- Mon Dec 01 17:46:57 IST 2014: XREENGINER PROGRAM(*ALL) XALIB(XAN4CDXA)
- Mon Dec 01 17:46:57 IST 2014: Library XAN4CDXA already exists in library list.
- Mon Dec 01 17:46:57 IST 2014: Member XAALIBL file XAALIBL in DBUK opened.
- Mon Dec 01 17:46:57 IST 2014: Open options ignored for shared open of member
OK

The 'Task Completed' message is displayed once the process is complete.

Now, double-click on the **Screen Components** node available under the cross-reference node in the navigation pane. It displays the Screen Components for the application. This option is also available for application areas.

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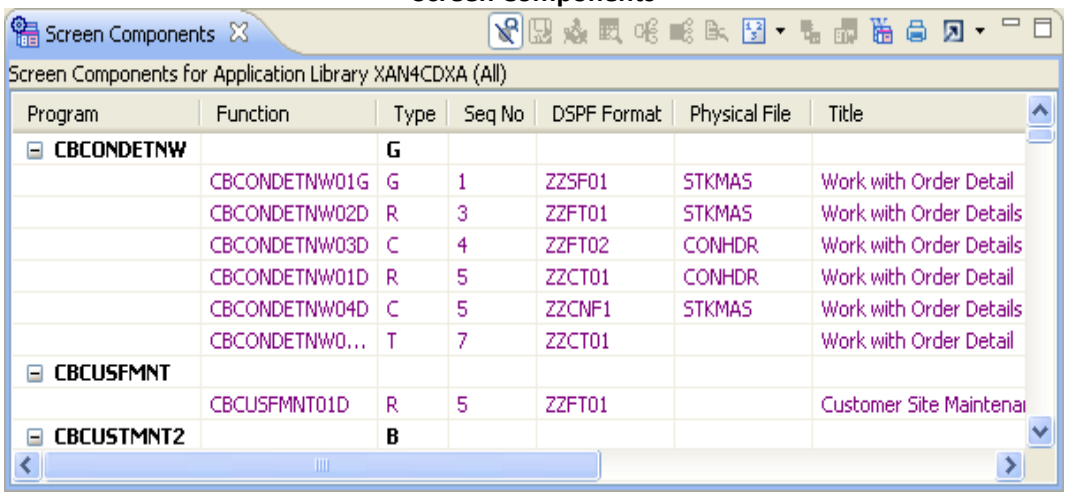
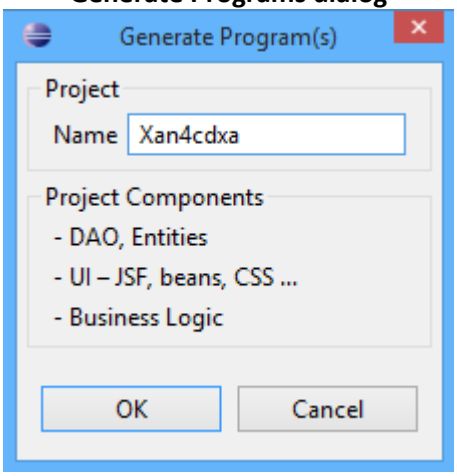
Screen Components



GENERATE PROGRAMS

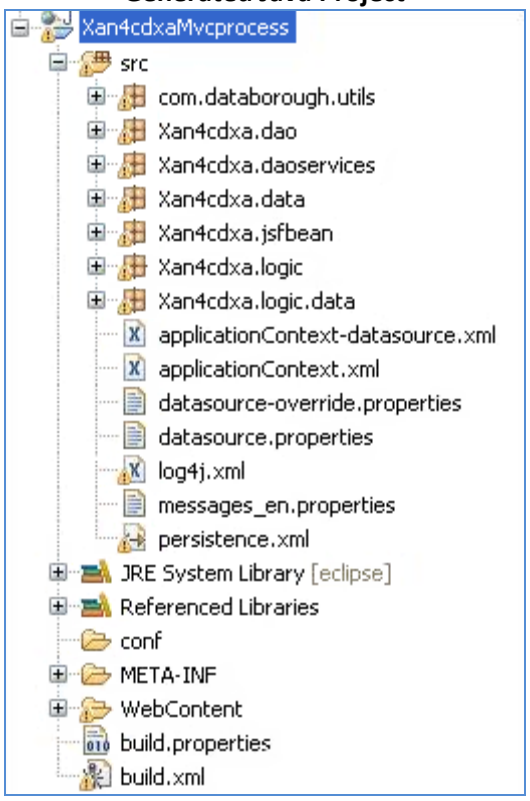
Select the **Generate Programs** option to generate a new Java application using the recovered screens and business logic.

Generate Programs dialog



The option generates a new Java application by default. The generated application follows MVC (Model-View-Controller) Architecture and uses Open frameworks viz., Spring, Hibernate, JSF 2.0 (Facelets), JQuery, etc. which drive it. The generated project has its neatly organized classes under various packages. See the screenshot below:

Generated Java Project



You can also generate the Silverlight/C# project. Here, the recovered screens are generated using Silverlight and the code behind/business logic is in C#.

INTER-REPOSITORY OPTIONS

X-Analysis provides an option to compare database files across two cross-reference libraries. The options available are as under:

- Generate Difference Analysis
- Generate PTF Analysis
- Display Difference Analysis
- PTF Analysis
- Customized Libraries
- Manage Linked Repositories

For detailed description, refer to the Inter-Repository Options section.

AUDIT OPTIONS

X-Analysis provides the following Audit Options:

- Metrics Analysis
- Screen Metrics
- File Metrics
- Business Process Logic Metrics
- Specialized Analysis
- Problem Analysis
- Object Allocation
- Database Summary
- Summary Report
- Initialize Source Archiving
- Generate Metrics Analysis
- Edit Problem Categories
- Generate Problem Analysis

For detailed description, refer to the Audit Options section.

WORK WITH MULTIPLE LIST OPTIONS

X-Analysis facilitates the users in working flexibly and methodically by generating multiple lists. Under an application library, double-click on these nodes – **Files**, **Programs** or **All Objects** – to invoke the **Work with Objects** dialog. Alternatively, click on the **Member List** icon from the toolbar to bring up the **Work with Members** dialog. Furthermore, you can access additional lists by double-clicking on the **Source Files** node to view the source list comprising source files. Double-clicking on an individual Source File will present its Member List.

The various lists that can be generated are as under:

Lists	Brief Description
Object List	Displays a list of all/specified objects.
Member List	Displays a list of all /specified source members.

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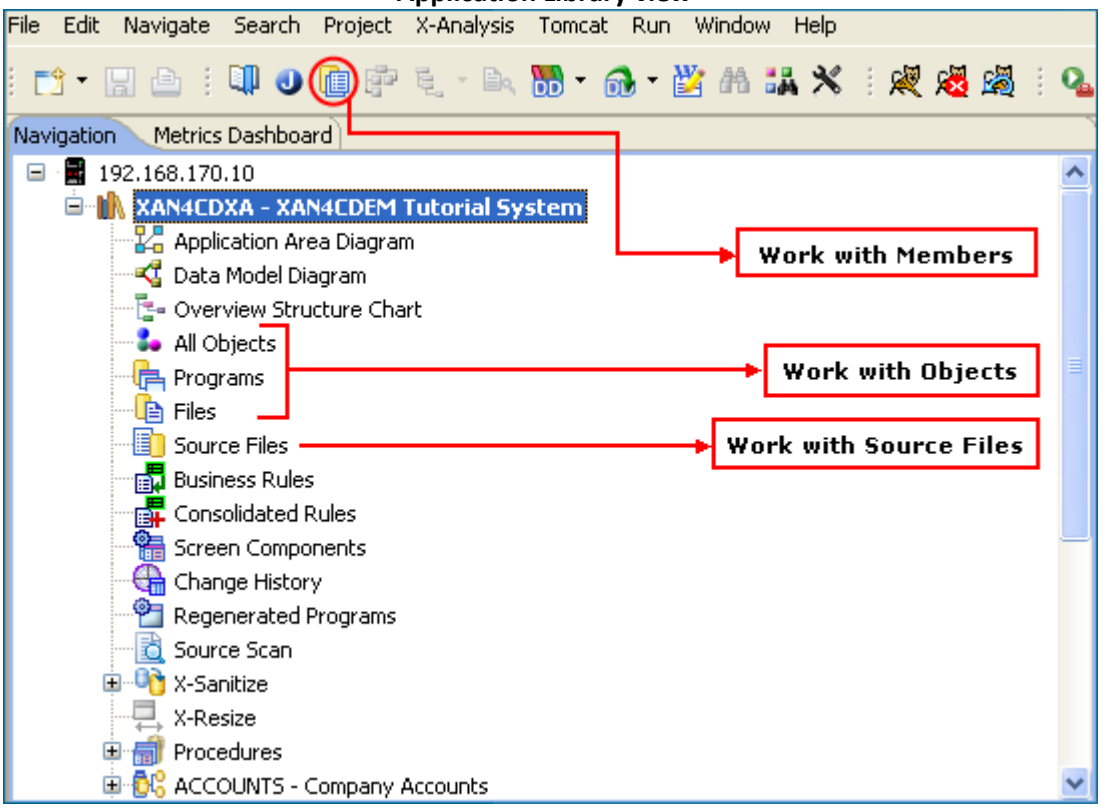
Lists	Brief Description
Source Files	Displays a list of all source files.
Business Rules	Displays a list of all business rules and their narrations.
Consolidated Rules	Displays a list of all rules based on file-field combination.
Screen Components	Displays a list of all reengineered components.
Change History	Displays a list of all source members that are modified.
Procedures	Displays a list of all procedures.
X-Analysis Bookmarks	Displays a list of objects that are bookmarked.

Application Library view



OBJECT LIST

The Object List displays a list of all objects of the specified type from the selected library. Double-click on the **All Objects** node under the cross-reference library (**XAN4CDXA**) to bring up the **Work with Objects** dialog.

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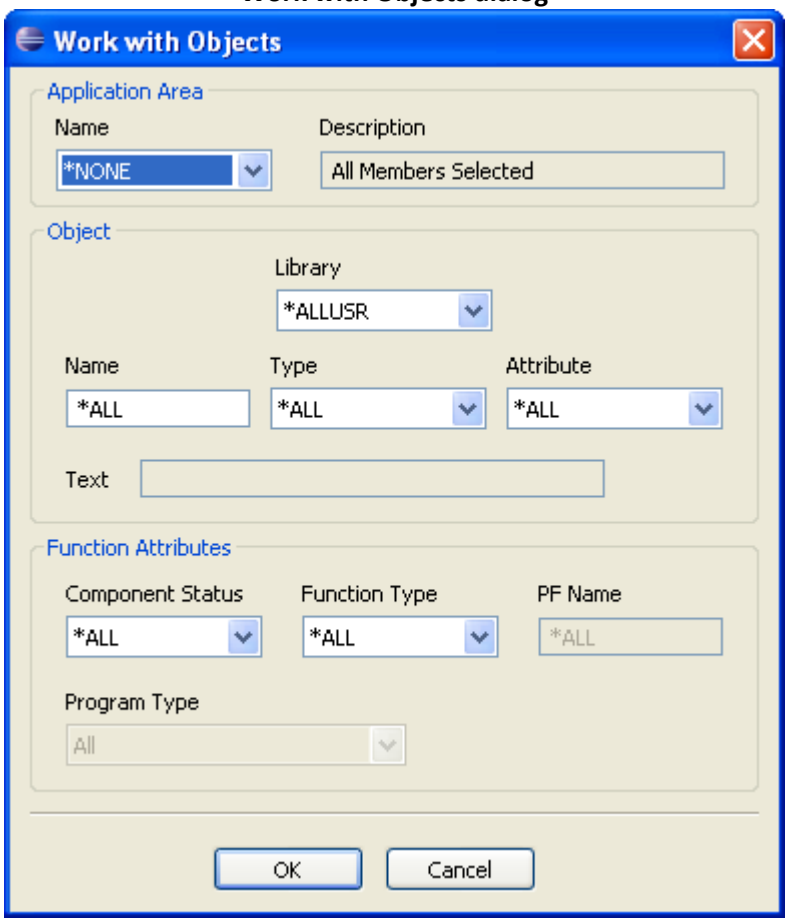
Work with Objects dialog



The Library drop-down box contains the following two important entries, apart from the user libraries:

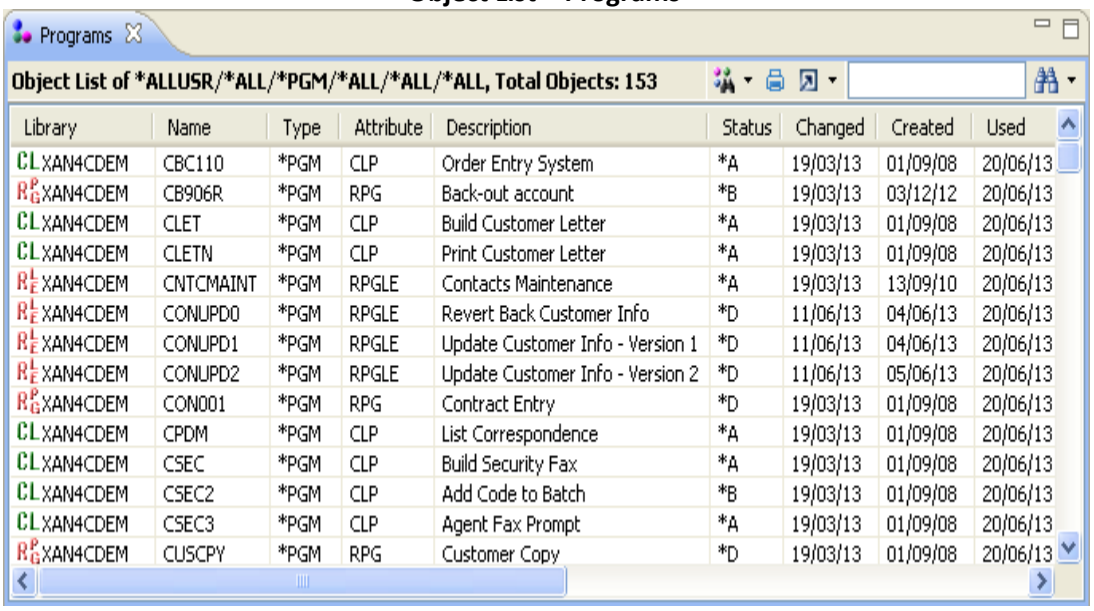
- ***ALLUSR** – All objects belonging to the user libraries
- ***ALL** – All objects (including those in the X-Ref lib)

The default option is ***ALLUSR**.

Programs

When you double-click on the **Programs** node, the same **Work with Objects** dialog is invoked, but with the Type/Attribute set as ***PGM**/***ALL**. Click **OK** to get the Object List for ***Programs**.

Object List – Programs



Library	Name	Type	Attribute	Description	Status	Changed	Created	Used
XAN4CDEM	CBC110	*PGM	CLP	Order Entry System	*A	19/03/13	01/09/08	20/06/13
XAN4CDEM	CB906R	*PGM	RPG	Back-out account	*B	19/03/13	03/12/12	20/06/13
XAN4CDEM	CLET	*PGM	CLP	Build Customer Letter	*A	19/03/13	01/09/08	20/06/13
XAN4CDEM	CLETN	*PGM	CLP	Print Customer Letter	*A	19/03/13	01/09/08	20/06/13
XAN4CDEM	CNTCMAINT	*PGM	RPGLE	Contacts Maintenance	*A	19/03/13	13/09/10	20/06/13
XAN4CDEM	CONUPD0	*PGM	RPGLE	Revert Back Customer Info	*D	11/06/13	04/06/13	20/06/13
XAN4CDEM	CONUPD1	*PGM	RPGLE	Update Customer Info - Version 1	*D	11/06/13	04/06/13	20/06/13
XAN4CDEM	CONUPD2	*PGM	RPGLE	Update Customer Info - Version 2	*D	11/06/13	05/06/13	20/06/13
XAN4CDEM	CON001	*PGM	RPG	Contract Entry	*D	19/03/13	01/09/08	20/06/13
XAN4CDEM	CPDM	*PGM	CLP	List Correspondence	*A	19/03/13	01/09/08	20/06/13
XAN4CDEM	CSEC	*PGM	CLP	Build Security Fax	*A	19/03/13	01/09/08	20/06/13
XAN4CDEM	CSEC2	*PGM	CLP	Add Code to Batch	*B	19/03/13	01/09/08	20/06/13
XAN4CDEM	CSEC3	*PGM	CLP	Agent Fax Prompt	*A	19/03/13	01/09/08	20/06/13
XAN4CDEM	CUSCPY	*PGM	RPG	Customer Copy	*D	19/03/13	01/09/08	20/06/13

The columns that appear in the Programs List are as follows:

Library: displays the name of the Object Library

Name: displays the name of the program

Type: displays the type of object; in this case it is *PGM

Attribute: displays the object attribute like RPG/LE or CLP or CBL

Description: displays textual description/long name of the program

Status: displays the program status which will be either *A, *B, *C or *D. The details are provided in the Component Status section on the following page.

Changed: displays the date when the program was changed

Created: displays the date the program was created

Used: displays the date when the program was last used

Function: displays the function of the object. The various types are explained under the Function Type section.

PF Name: displays the name of the physical file related to the program

BR Count: displays the total count of business rules related to the program

Annot. Count: displays the total count of business rule annotations related to the program

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Stmt. Count: displays the total count of the statements in the source list of the program

Screen Count: displays the total count of screens recovered by the re-engineering process

Mode Count: displays the total count of modes available to access the screens belonging to a program.

Double-click on the list item opens the object's source code in the source browser.

Files

Similarly, double-click the **Files** node under **XAN4CDXA** to bring up the **Work with Objects** dialog with the Type/Attribute set to ***FILE/PF**. Double-clicking on the **All Objects** node re-sets the Type/Attribute to ***ALL/*ALL**.

The following screen displays the Object List for Files:

Object List – Files

Files

Object List of *ALLUSR/*ALL/*FILE/PF/*ALL/*ALL, Total Objects: 50

Library	Name	Type	Attribute	Description	Status	Changed	Created
XAN4CDEM	ASIMPLTEST	*FILE	PF		*D	05/06/12	30/03/11
XAN4CDEM	ASTATUS	*FILE	PF	Status file	*A	05/06/12	01/09/08
XAN4CDEM	CNTACS	*FILE	PF	Contacts	*C	05/06/12	01/09/08
XAN4CDEM	CONDET	*FILE	PF	Contract Detail	*B	15/08/12	01/09/08
XAN4CDEM	CONDETNW	*FILE	PF	Contract Detail new -?...	*D	05/06/12	02/02/11
XAN4CDEM	CONHDR	*FILE	PF	Contract Header	*B	25/09/12	01/09/08
XAN4CDEM	CPYBKSRC	*FILE	PF	Cobol copybooks	*D	05/06/12	10/05/11
XAN4CDEM	CUSF	*FILE	PF	Sites	*B	22/06/12	01/09/08
XAN4CDEM	CUSGRP	*FILE	PF	Customer Groups	*A	05/06/12	01/09/08
XAN4CDEM	CUSTS	*FILE	PF	Purchases	*B	04/10/12	01/09/08
XAN4CDEM	DELIVA	*FILE	PF	Delivery Areas	*B	05/06/12	01/09/08
XAN4CDEM	DISTS	*FILE	PF	Distributors	*A	05/06/12	01/09/08

The description of the columns that appear in the Files List are as follows:

Library: displays the name of the Object Library

Name: displays the name of the file

Type: displays the type of object; in this case it is *FILE

Attribute: displays the object attribute like PF, LF, DSPF or PRTF

Description: displays textual description/long name of the file

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Status: displays the file status which will be either *A, *B, *C or *D. The details are provided in the Component Status section on the following page.

Changed: displays the date when the file was changed

Created: displays the date the file was created

Used: displays the date when the file was last used.

Stmt. Count: displays the total count of the statements in the source list of the file

*Format Count**: displays the total count of screen formats related to a file.The displayed Object List is sorted on an Object's name in ascending order. Click the respective column heading to change the sort order.***

To narrow down the search, the object name on the object group may be mentioned as well. It can be:

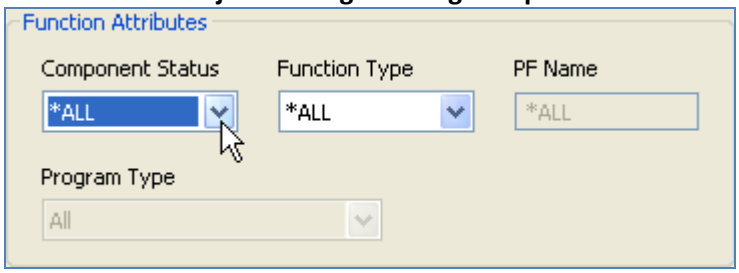
- *ALL
- Object Name (maximum 10 characters long).

Besides the other settings, the following can also be specified on the dialog:

Component Status

The Component Status can be picked up by selecting appropriate status, for e.g. *A,*B, etc. under the **Function Attributes** section**.**

Work with Objects dialog showing Component Status



Component Status for Programs

- *A – Parent or top-level program i.e. calls other programs but is not called itself
- *B – Program is called by another and also calls other programs
- *C – Program at the end of a program tree; does not call other programs
- *D – Standalone program

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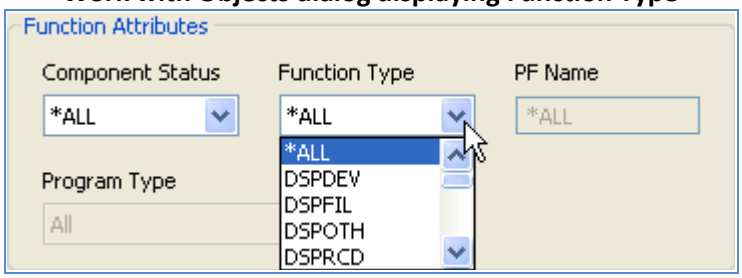
Component Status for Files

- *A – Accessed by other files, but does not access any other file
- *B – Accesses other files and gets accessed by other files
- *C – Only accesses other files, not accessed by others
- *D – Standalone file

Function Type

This describes the function of the object and based on COOL: 2E definitions.

Work with Objects dialog displaying Function Type



The Function Attributes apply to program type objects only. The available Function Types are defined here:

***ALL** – Displays all objects; no function filter is applied.

DSPDEV – Defines a program which includes the Display file/s.

DSPFIL (Display File) – Defines a program which displays the records from a specified file, many at a time, using a sub-file.

DSPOTH (Display Other) – Defines a program which displays records from Display File(s) and does not have any file(s) in update/write/read mode. Also the program does not have any Printer File(s).

DSPRCD (Display Record) – Defines a program which displays a single record from a specified database file.

DSPRCD2 (Display Record 2 panels) – Defines a program that is identical to the DSPRCD function, except that it allows the database record details to extend to two separate display device pages.

DSPRCD3 (Display Record 3 panels) – Defines a program that is identical to the DSPRCD function, except that it allows the database record details to extend to three separate display device pages.

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DSPTRN (Display Transaction) – Defines a program which displays the records from a specified pair of database files. The pair must be connected by an **Owned by** or **Refers to** relation.

EDTFIL (Edit File) – Defines a program which maintains records on a specified file, many at a time, using a sub-file.

EDTRCD (Edit Record) – Defines a program which maintains (add, change, and delete) records on a specified file, one at a time.

EDTTRN (Edit Transaction) – Defines a program which maintains the records on a specified pair of header and detail files. The pair must be connected by an **Owned by** or **Refers to** relation.

EDTRCD2 (Edit Record 2 panels) – Is identical to the Edit Record function, except that it allows the record details to extend to two separate display pages.

EDTRCD3 (Edit Record 3 panels) – Is identical to the Edit Record function, except that it allows the record details to extend to three separate display pages.

EXCUSRPGM (Execute User Program) – Defines a program which allows a user to describe the interface to a user-written HLL program so that it can be referenced by functions.

OTH (Other) – Defines a program which calls a program and does not have any files in update/write/read mode. Also the program does not have any Display File(s) or Printer File(s).

OTHCAL (Other Call) – It is identical to the OTH function except that it allows call with parameters.

OTHFIL (Other File) – Defines a program which accepts files in input mode and does not have Printer File(s), Display File(s) or any other files in update/write mode.

PMTRCD (Prompt Record) – Defines a program which prompts for a list of fields defined by a specified access path. The validated values can be passed to any other function.

PRTDSP (Print Display) – Defines a program which Display/Print records from input files and does not have any files in update/write mode.

PRTFIL (Print File) – Defines a program which prints records from a specified access path.

SELRCD (Select Record) – Defines a program which displays the records from a specified file, many at a time, using a sub-file. The program allows you to select one of the records. The selected record is returned to the calling program. This function is called from a function that requested a selection list.

UPDFIL (Update File) – Defines a program which updates specified files and does not have any Printer File(s) or Display File(s).

UPDOTH (Update Other) – Defines a program which updates data areas and has Display File(s). The program neither has a Printer File(s) nor files in update/write/read mode.

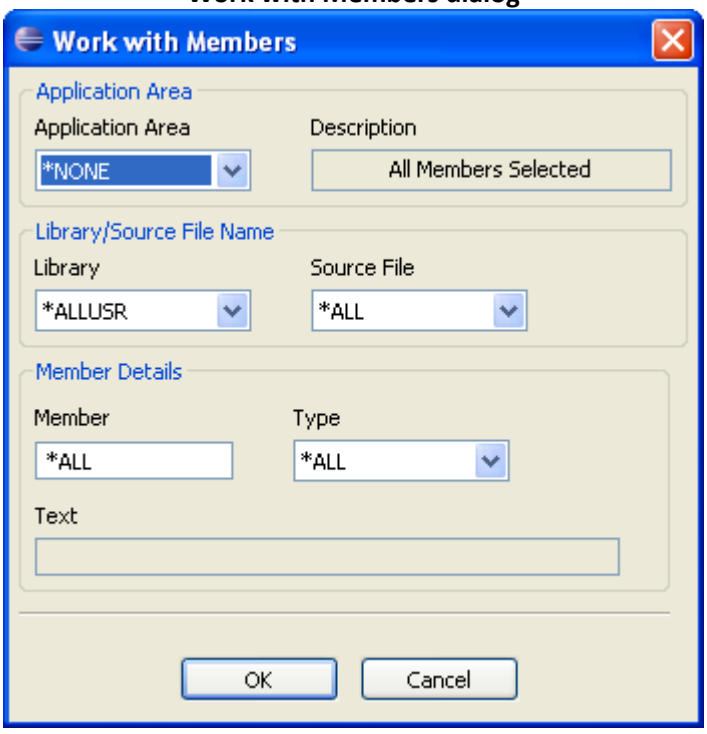
UPDPRT (Update Print) – Defines a program which prints a report with update(s) from the specified printer files. It does not have display files.

MEMBER LIST

The **Member List** option displays the list of source members for a specified source file of the selected library. The Member List contains the members available in the selected library and the source file, based on the selected criteria.

Click the **Member List** icon, the following dialog is invoked:

Work with Members dialog



Specify the selection criteria on the dialog to display a set of members.

1. Select the Source File and the Library using the drop-down list. Selecting ***ALLUSR** as the library name prevents the source files in the cross-reference library from getting displayed.

2. The Member name on the Member Details group can be:

    - *ALL
    - Member Name (maximum 10 characters long)

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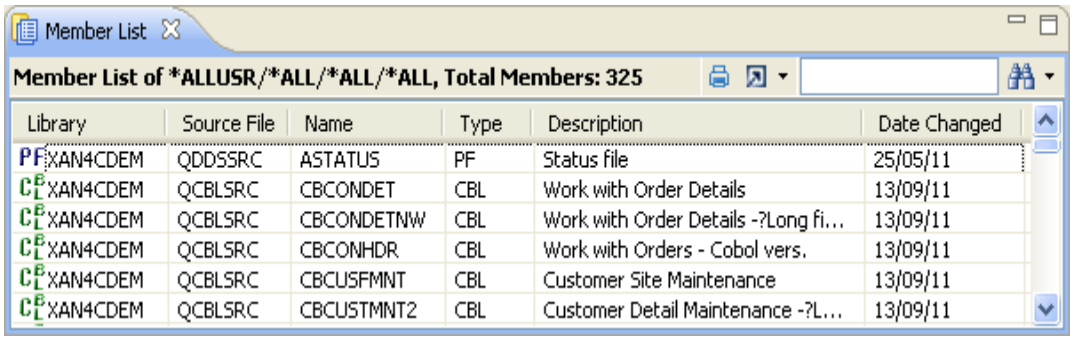
3. Select the Type from the drop-down list.

4. Click **OK**.

The following screen displays the list of members for the selected criteria. Select any member and double-click to invoke its Source List.

Member List

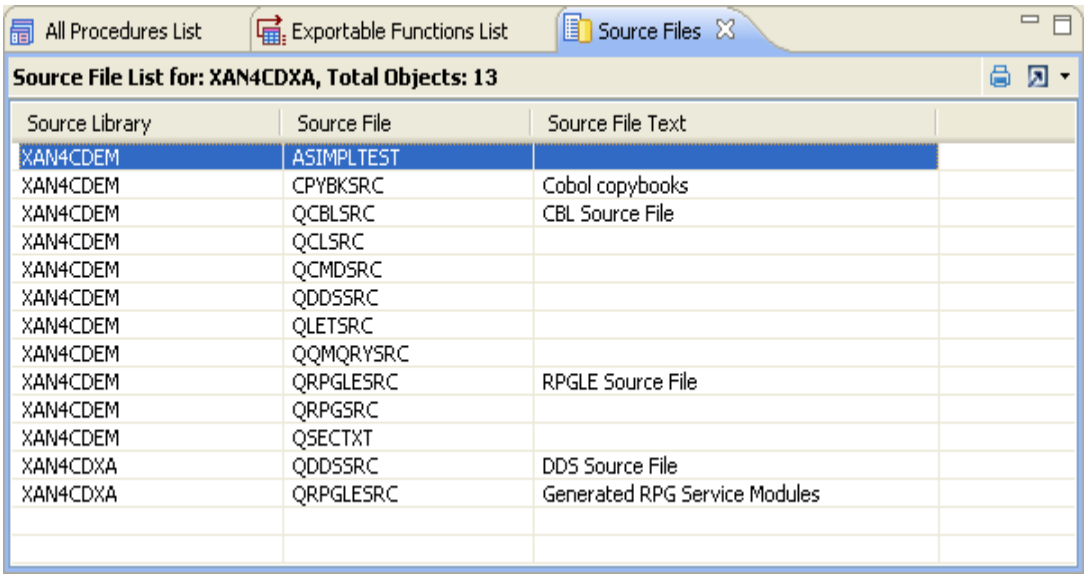

Member List
Member List of *ALLUSR/*ALL/*ALL/*ALL, Total Members: 325
Library | Source File | Name | Type | Description | Date Changed
XAN4CDEM | QDDSSRC | ASTATUS | PF | Status file | 25/05/11
XAN4CDEM | QCBLSRC | CBCONDET | CBL | Work with Order Details | 13/09/11
XAN4CDEM | QCBLSRC | CBCONDETNW | CBL | Work with Order Details -?Long fi... | 13/09/11
XAN4CDEM | QCBLSRC | CBCONHDR | CBL | Work with Orders - Cobol vers. | 13/09/11
XAN4CDEM | QCBLSRC | CBCUSFMNT | CBL | Customer Site Maintenance | 13/09/11
XAN4CDEM | QCBLSRC | CBCUSTMNT2 | CBL | Customer Detail Maintenance -?L... | 13/09/11

The first screen is sorted on the member name in ascending order. To change the sort order or to sort on any other column, click the respective column heading.

SOURCE FILES

Double-click on the **Source Files** node to generate a list of all the source files. The option is available under the cross-reference node. Double-click on any source file to display the Member List.

Source File List

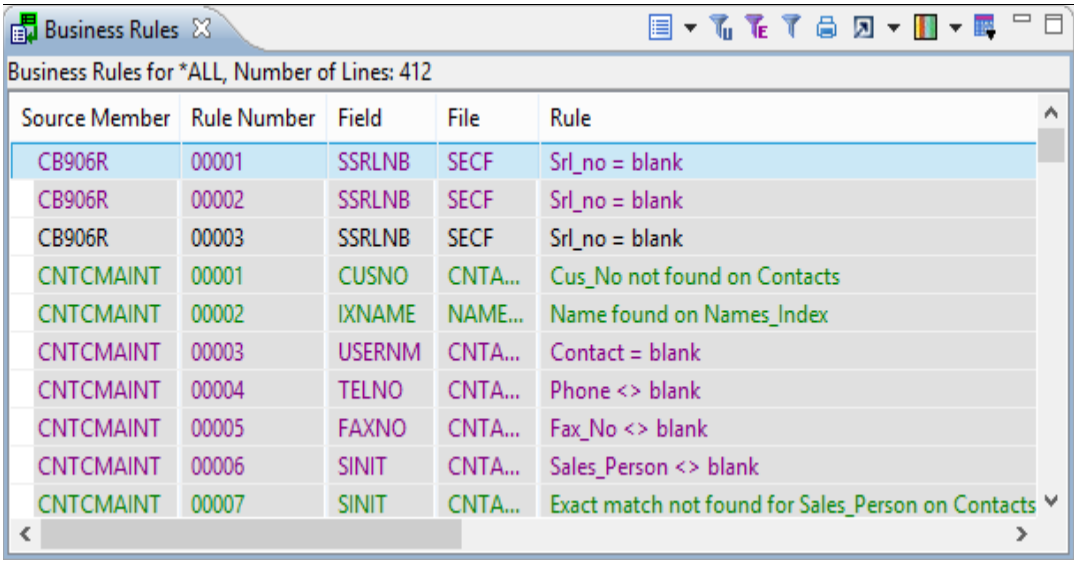

All Procedures List
Exportable Functions List
Source Files
Source File List for: XAN4CDXA, Total Objects: 13
Source Library | Source File | Source File Text
XAN4CDEM | ASIMPLTEST |
XAN4CDEM | CPYBKSRC | Cobol copybooks
XAN4CDEM | QCBLSRC | CBL Source File
XAN4CDEM | QCLSRC |
XAN4CDEM | QCMDSRC |
XAN4CDEM | QDDSSRC |
XAN4CDEM | QLETSRC |
XAN4CDEM | QQMQRYSRC |
XAN4CDEM | QRPGLESRC | RPGLE Source File
XAN4CDEM | QRPGSRC |
XAN4CDEM | QSECTXT |
XAN4CDXA | QDDSSRC | DDS Source File
XAN4CDXA | QRPGLESRC | Generated RPG Service Modules

BUSINESS RULES

The program source is grouped into discrete blocks of logic so that each block represents a particular execution of business logic. This block of code is then converted into pseudo code that describes the execution of the logic. Literals and constants are liberally used in the narration, wherever possible, giving accurate descriptions of the logic. These logics are termed as Business Rules.

The **Business Rules** option displays a list of all the business rules and their narrations for the selected cross-reference library. The **Business Rules** node is available under the cross-reference node.

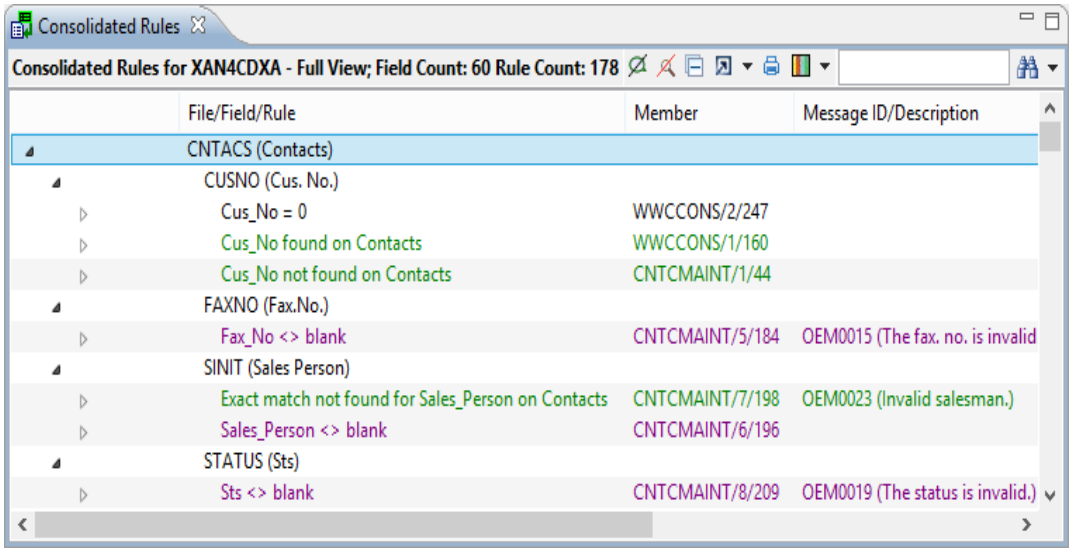
Business Rules for XAN4CDXA


Business Rules
Business Rules for *ALL, Number of Lines: 412
Source Member | Rule Number | Field | File | Rule
CB906R | 00001 | SSRLNB | SECF | Srl_no = blank
CB906R | 00002 | SSRLNB | SECF | Srl_no = blank
CB906R | 00003 | SSRLNB | SECF | Srl_no = blank
CNTCMAINT | 00001 | CUSNO | CNTA... | Cus_No not found on Contacts
CNTCMAINT | 00002 | IXNAME | NAME... | Name found on Names_Index
CNTCMAINT | 00003 | USERNM | CNTA... | Contact = blank
CNTCMAINT | 00004 | TELNO | CNTA... | Phone <> blank
CNTCMAINT | 00005 | FAXNO | CNTA... | Fax_No <> blank
CNTCMAINT | 00006 | SINIT | CNTA... | Sales_Person <> blank
CNTCMAINT | 00007 | SINIT | CNTA... | Exact match not found for Sales_Person on Contacts

CONSOLIDATED RULES

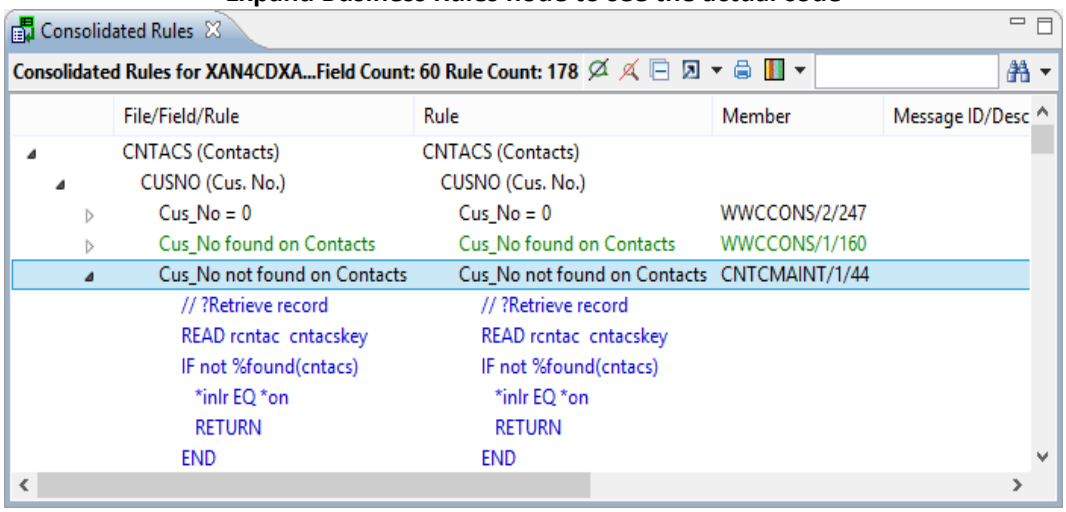
X-Analysis provides an important feature related to file-fields and business rules. Through this feature you can view all the business rules related to a file-field. Double-click the **Consolidated Rules** node to invoke the following window:

Consolidated Rules for XAN4CDXA



Select any business rule listed under a file and expand the business rules node to check the actual business rules code used, as shown below:

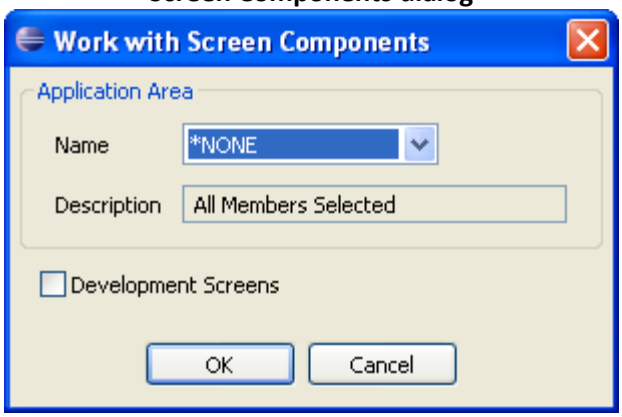
Expand Business Rules node to see the actual code



SCREEN COMPONENTS

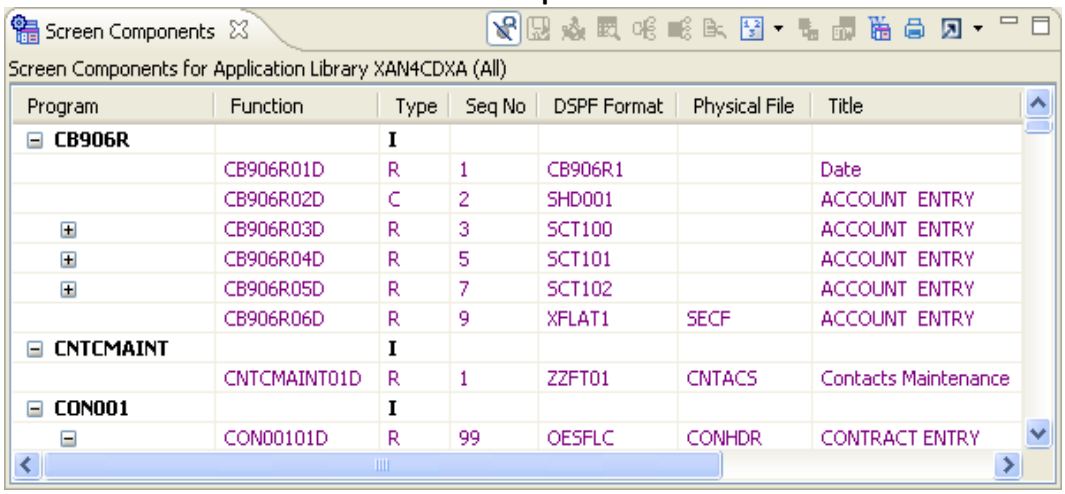
The reengineering process involves several steps that generate various reengineered components for each program. There are eight types of reengineered components, details of which are accessible through the **Screen Components** option. Double-click on the **Screen Components** node to invoke the **Work with Screen Components** dialog, as shown below:

Screen Components dialog



Click **OK** to generate the list of all Screen Components.

Screen Components List



The following table displays the details of the generated reengineered components:

Component	Type	Description
TSAJE1R	*PGM	Executable reengineered program
TSAJE1RB	*SRVPGM	Created using TSAJE1RA and TSAJE1RB modules
TSAJE1R	*MODULE	UI module for the Reengineered program
TSAJE1RA	*MODULE	Re-engineered Action Diagram aka Programmed Module
TSAJE1RB	*MODULE	Re-engineered Controller aka Generated Code Module
TSAJE1RB	*FILE	Program Variables structure aka Program Data Object
TSAJE1RD	*FILE	Display file used by the reengineered program
TSAJE1RG	*FILE	Grid Data Object

To display the list of the 'Screen Components' for a specific program, opt for the context menu on that program and select the **Screen Components** option.

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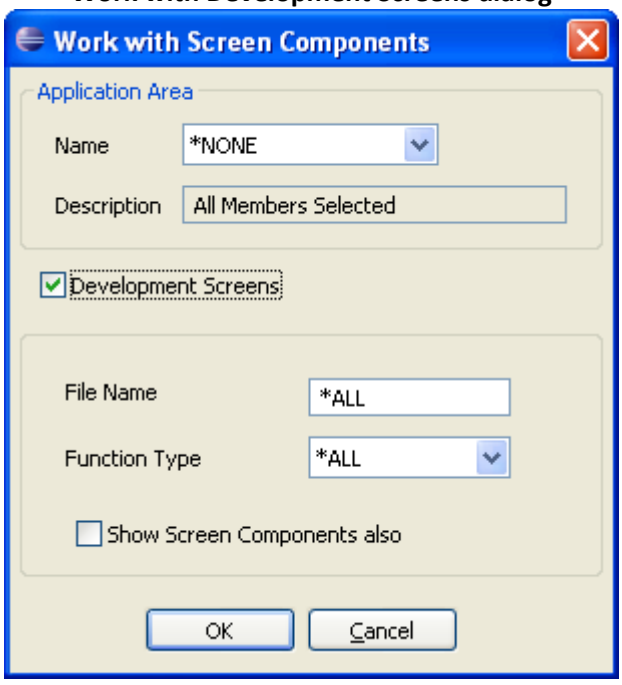
Development Screens

A Development Screen is a set of data that describes how information is to be displayed on a screen and governs the user interactivity with that information. For instance, validation information may be held for a field or details of a program to be called when the record is updated. In short, a Development Screen is a set of metadata relating to a screen display.

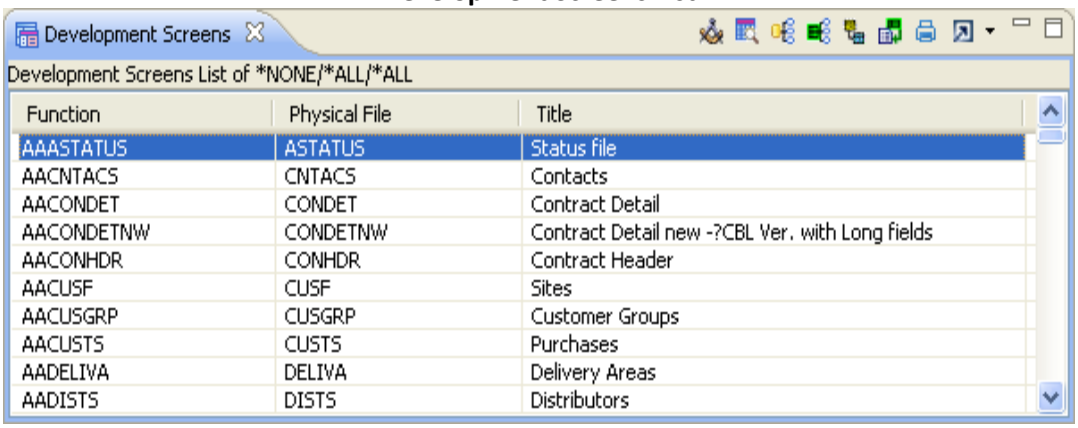
Select **Screen Components** and double-click on it to display the **Work with Screen Components** dialog. Then, check the **Development Screens** box which expands the dialog for the **Development Screens** option as shown below:

Work with Development Screens dialog



Click **OK** to generate a list of all Development Screens for the cross-reference library.

Development Screens List



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The columns of Development Screens List are described below:

- **Function:** This column lists the Standard Development Screen Definitions associated with the Development Screen in X-Analysis. These Standard Development Screen Definitions are built when the data model is created, directly from the database of the existing application, using the data model relationships to control cross-file validation and navigation.

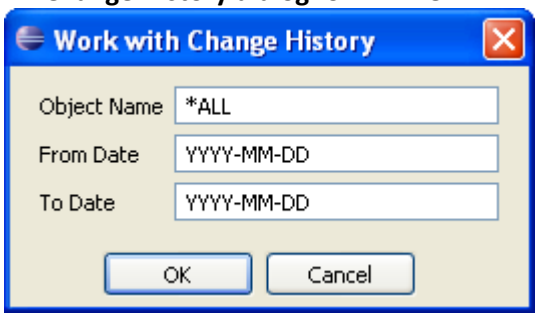
- **Physical File:** This column represents the associated Physical File name with the specific Standard Development Screen in the database. Standard Development Screens tie directly to physical files, and can be used for file maintenance and display, as well as providing searchable grids and general purpose reports.

- **Title:** This represents the description of the Development Screen as per the database.

CHANGE HISTORY

The **Change History** option lists the source members that have a change in their history. Double-clicking the **Change History** node under **XAN4CDXA** invokes the following **Work with Change History** dialog:

Change History dialog for XAN4CDXA



Click **OK** to invoke the following window.

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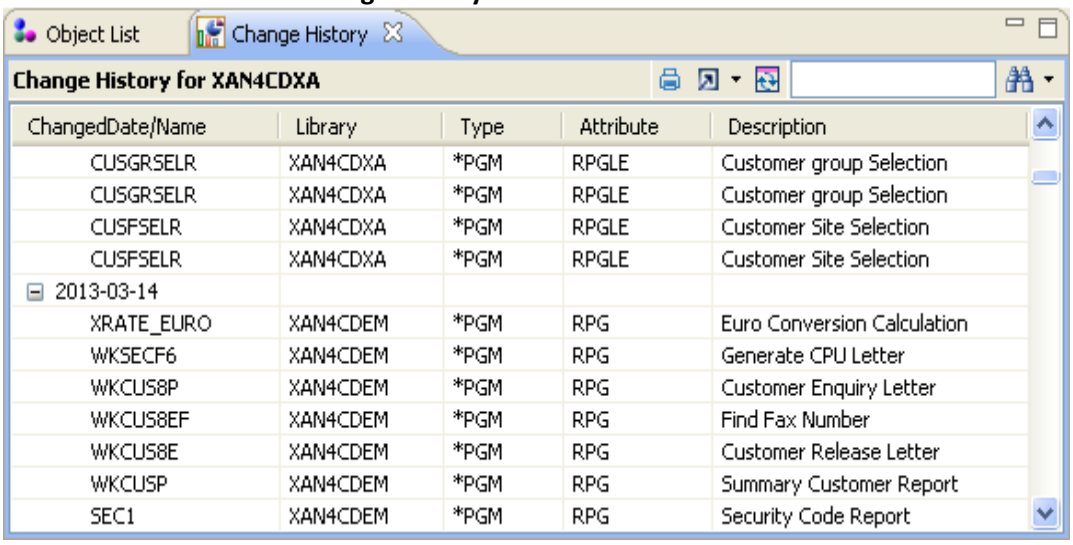
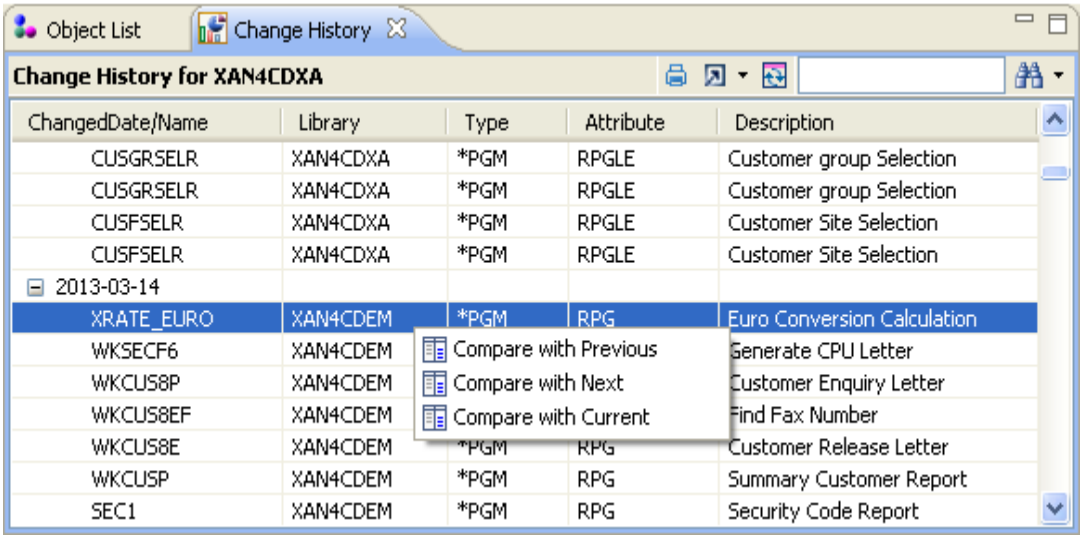
Change History window for XAN4CDXA


Object List
Change History
Change History for XAN4CDXA
ChangedDate/Name | Library | Type | Attribute | Description
CUSGRSELR | XAN4CDXA | *PGM | RPGLE | Customer group Selection
CUSGRSELR | XAN4CDXA | *PGM | RPGLE | Customer group Selection
CUSFSELR | XAN4CDXA | *PGM | RPGLE | Customer Site Selection
CUSFSELR | XAN4CDXA | *PGM | RPGLE | Customer Site Selection
2013-03-14
XRATE_EURO | XAN4CDEM | *PGM | RPG | Euro Conversion Calculation
WKSECF6 | XAN4CDEM | *PGM | RPG | Generate CPU Letter
WKCUS8P | XAN4CDEM | *PGM | RPG | Customer Enquiry Letter
WKCUS8EF | XAN4CDEM | *PGM | RPG | Find Fax Number
WKCUS8E | XAN4CDEM | *PGM | RPG | Customer Release Letter
WKCUSP | XAN4CDEM | *PGM | RPG | Summary Customer Report
SEC1 | XAN4CDEM | *PGM | RPG | Security Code Report

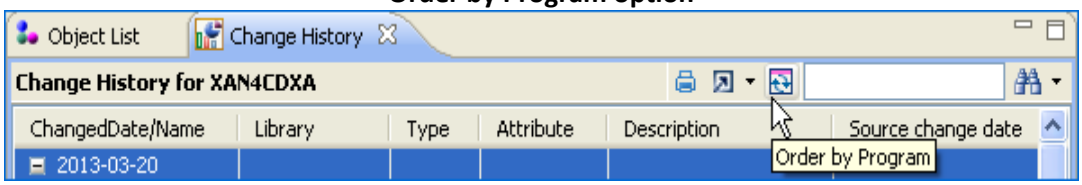
Select a row from the window and opt for the context menu to call up a suitable source compare window. The following screen displays the context menu against a selected row:

Context Menu displaying Source Compare Options


Object List
Change History
Change History for XAN4CDXA
ChangedDate/Name | Library | Type | Attribute | Description
CUSGRSELR | XAN4CDXA | *PGM | RPGLE | Customer group Selection
CUSGRSELR | XAN4CDXA | *PGM | RPGLE | Customer group Selection
CUSFSELR | XAN4CDXA | *PGM | RPGLE | Customer Site Selection
CUSFSELR | XAN4CDXA | *PGM | RPGLE | Customer Site Selection
2013-03-14
XRATE_EURO | XAN4CDEM | *PGM | RPG | Euro Conversion Calculation
WKSECF6 | XAN4CDEM
WKCUS8P | XAN4CDEM
WKCUS8EF | XAN4CDEM
WKCUS8E | XAN4CDEM
WKCUSP | XAN4CDEM | *PGM | RPG | Summary Customer Report
SEC1 | XAN4CDEM | *PGM | RPG | Security Code Report
Compare with Previous
Compare with Next
Compare with Current

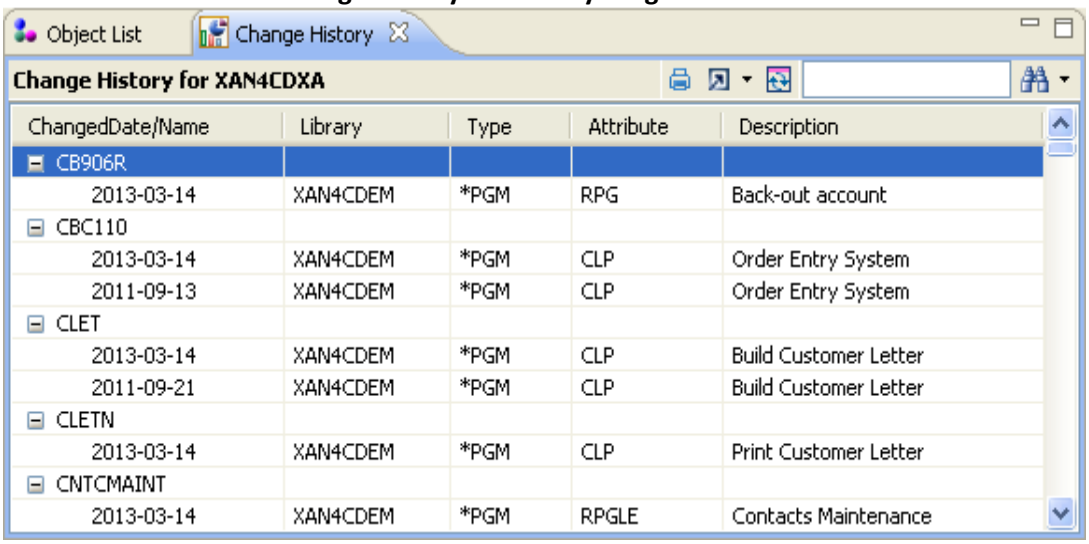
You can also view the Change History data in the program sequence. For this, click on the **Order by Program** option available on the toolbar.

Order by Program option


Object List
Change History
Change History for XAN4CDXA
ChangedDate/Name | Library | Type | Attribute | Description | Source change date
2013-03-20
Order by Program

The following screen will invoke:

Change History – Order by Program window

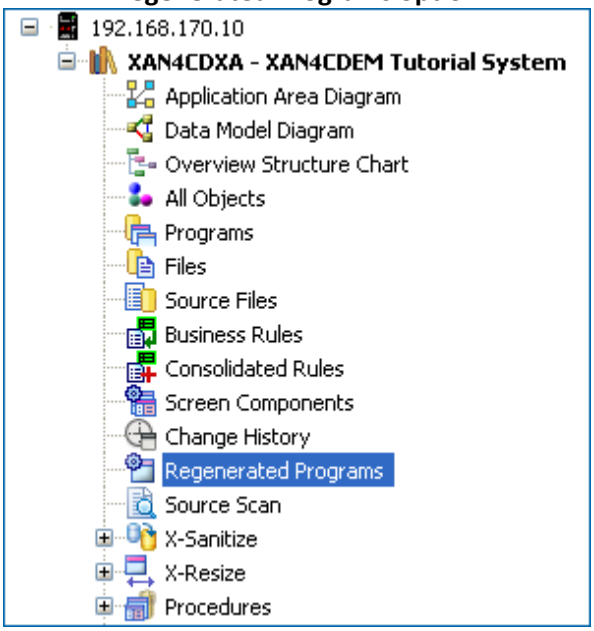


ChangedDate/Name	Library	Type	Attribute	Description
CB906R				
2013-03-14	XAN4CDEM	*PGM	RPG	Back-out account
CBC110				
2013-03-14	XAN4CDEM	*PGM	CLP	Order Entry System
2011-09-13	XAN4CDEM	*PGM	CLP	Order Entry System
CLET				
2013-03-14	XAN4CDEM	*PGM	CLP	Build Customer Letter
2011-09-21	XAN4CDEM	*PGM	CLP	Build Customer Letter
CLETN				
2013-03-14	XAN4CDEM	*PGM	CLP	Print Customer Letter
CNTCMAINT				
2013-03-14	XAN4CDEM	*PGM	RPGLE	Contacts Maintenance

REGENERATED PROGRAMS

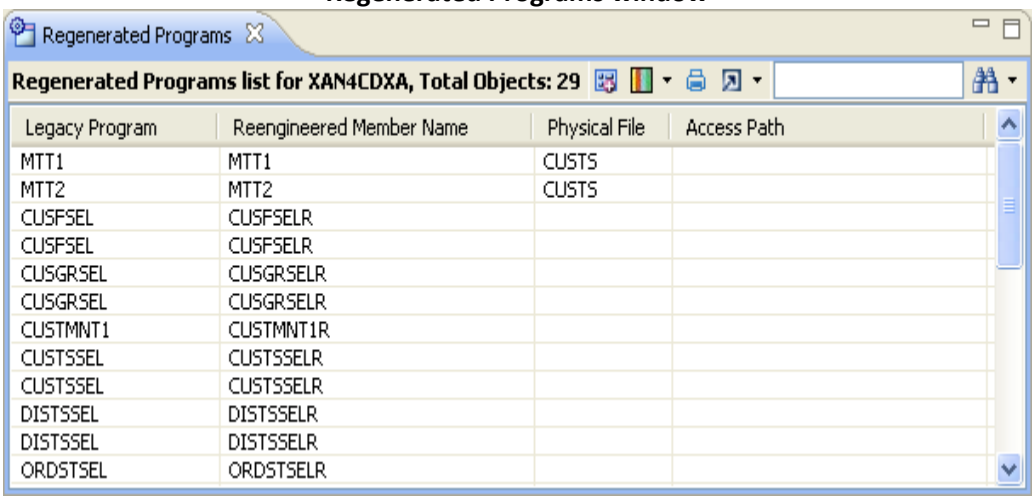
You can view the list of programs which have been regenerated through the **Regenerated Programs** node. The node is available on the navigation pane of the tutorial application, as shown below:

Regenerated Programs option



Double-click the node to invoke the following window:

Regenerated Programs window

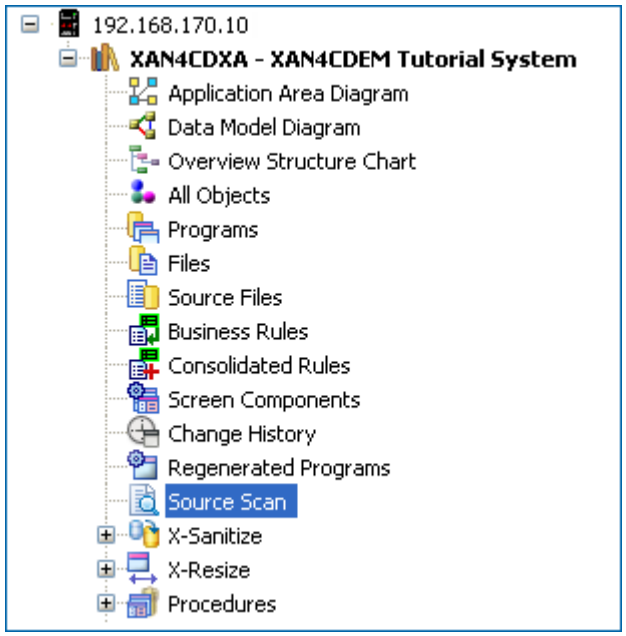


SOURCE SCAN

The **Source Scan** node helps you scan particular text (also comments) used in a prescribed source member, or in general, all across the application/application area.

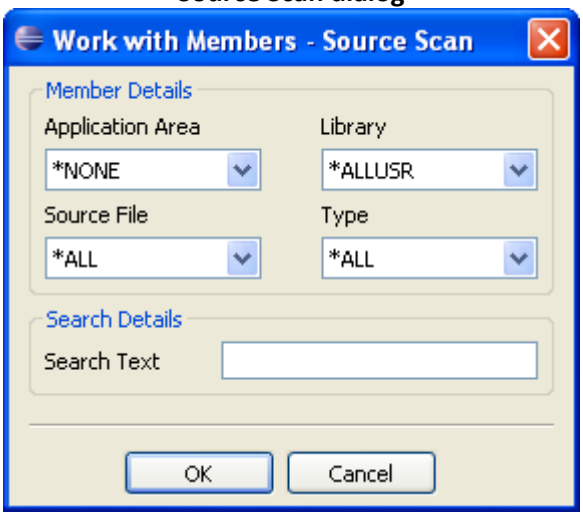
The node is available on the navigation pane, as shown below:

Source Scan node



Double-click the node to invoke the **Work with Members – Source Scan** dialog.

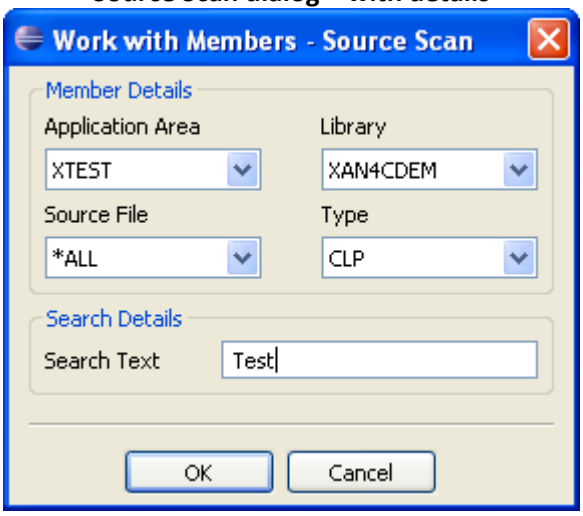
Source Scan dialog



You can provide keywords in the 'Search Text' box. If an application area is not selected, then click **OK** to scan the entire application for the Object(s) with the keywords specified by you. Limit the scan by selecting appropriate details in the other drop-down boxes. In this way you will get results quickly. The words mentioned in the 'Search Text' box will also scan the source member(s) for comments (if any) containing the keywords.

Select the required Member Details and fill in the keyword/s, as is shown below.

Source Scan dialog – with details



When the scan is complete, the Source Scan result is displayed as follows:

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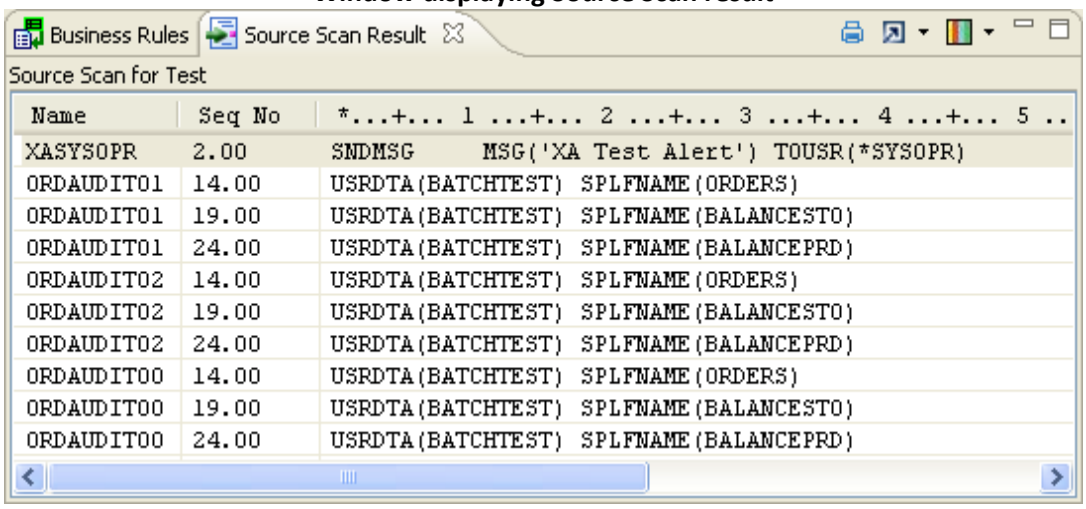
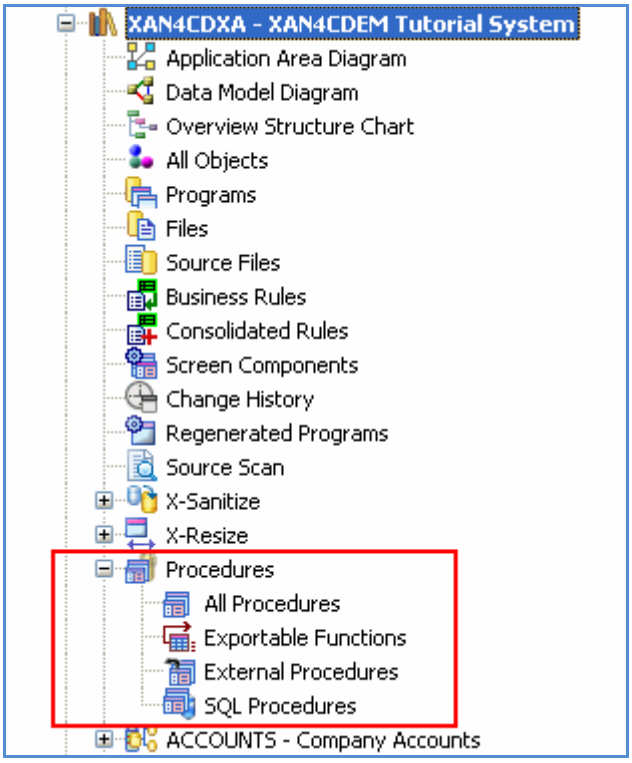
Window displaying Source Scan result


Business Rules
Source Scan Result
Source Scan for Test
Name Seq No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ..
XASYSOPR 2.00 SNDMSG MSG('XA Test Alert') TOUSR(*SYSOPR)
ORDAUDIT01 14.00 USRDTA(BATCHTEST) SPLFNAME(ORDERS)
ORDAUDIT01 19.00 USRDTA(BATCHTEST) SPLFNAME(BALANCESTO)
ORDAUDIT01 24.00 USRDTA(BATCHTEST) SPLFNAME(BALANCEPRD)
ORDAUDIT02 14.00 USRDTA(BATCHTEST) SPLFNAME(ORDERS)
ORDAUDIT02 19.00 USRDTA(BATCHTEST) SPLFNAME(BALANCESTO)
ORDAUDIT02 24.00 USRDTA(BATCHTEST) SPLFNAME(BALANCEPRD)
ORDAUDIT00 14.00 USRDTA(BATCHTEST) SPLFNAME(ORDERS)
ORDAUDIT00 19.00 USRDTA(BATCHTEST) SPLFNAME(BALANCESTO)
ORDAUDIT00 24.00 USRDTA(BATCHTEST) SPLFNAME(BALANCEPRD)

PROCEDURES

Select the **Procedures** node to access procedure-related information. This node is available on the navigation pane of the application. Expand the **Procedures** node to reveal four sub-nodes displayed below:

Procedures node



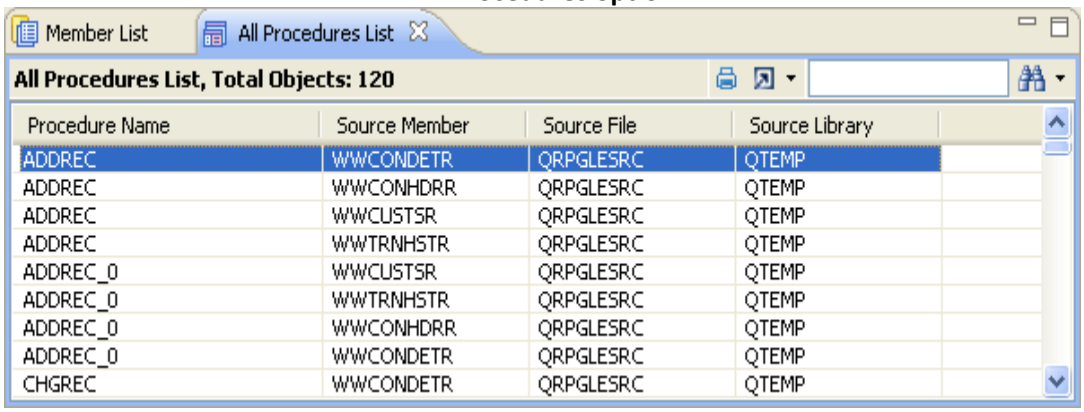
These options are discussed as under:

All Procedures

The first option under the **Procedures** node is **All Procedures**.

Select **All Procedures** to display a list of members. The members in this list have procedures defined in their source code.

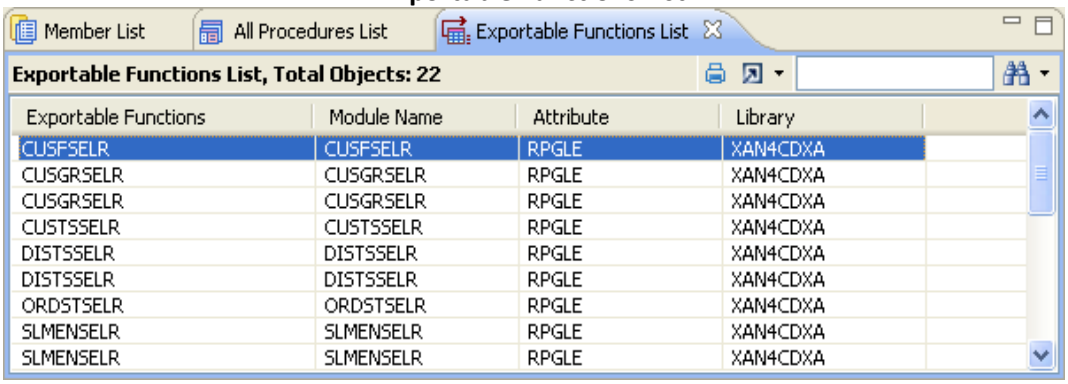
All Procedures option



Exportable Functions

Select the **Exportable Functions** option to display the list of names of exported procedures and variables in a module, which can be referred to by other modules.

Exportable Functions List

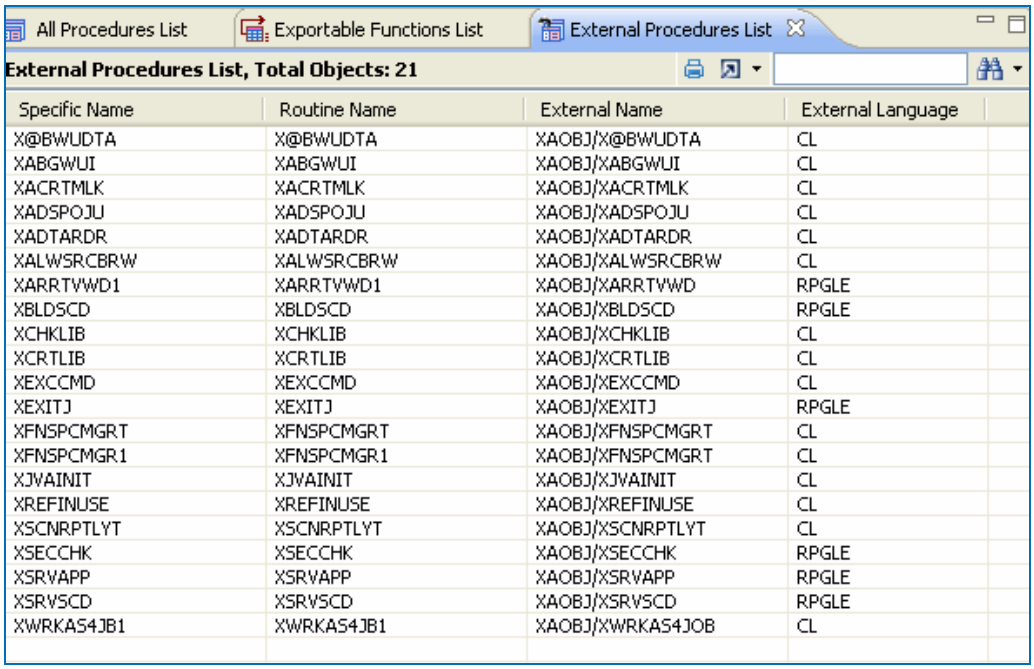


External Procedures

The third option under the **Procedures** node is **External Procedures**. This option registers high-level language program like RPG, Java, C#, etc. as a stored procedure. However, the procedure may or may not use SQL.

Select the **External Procedures** option to invoke the following window:

Window – External Procedures List



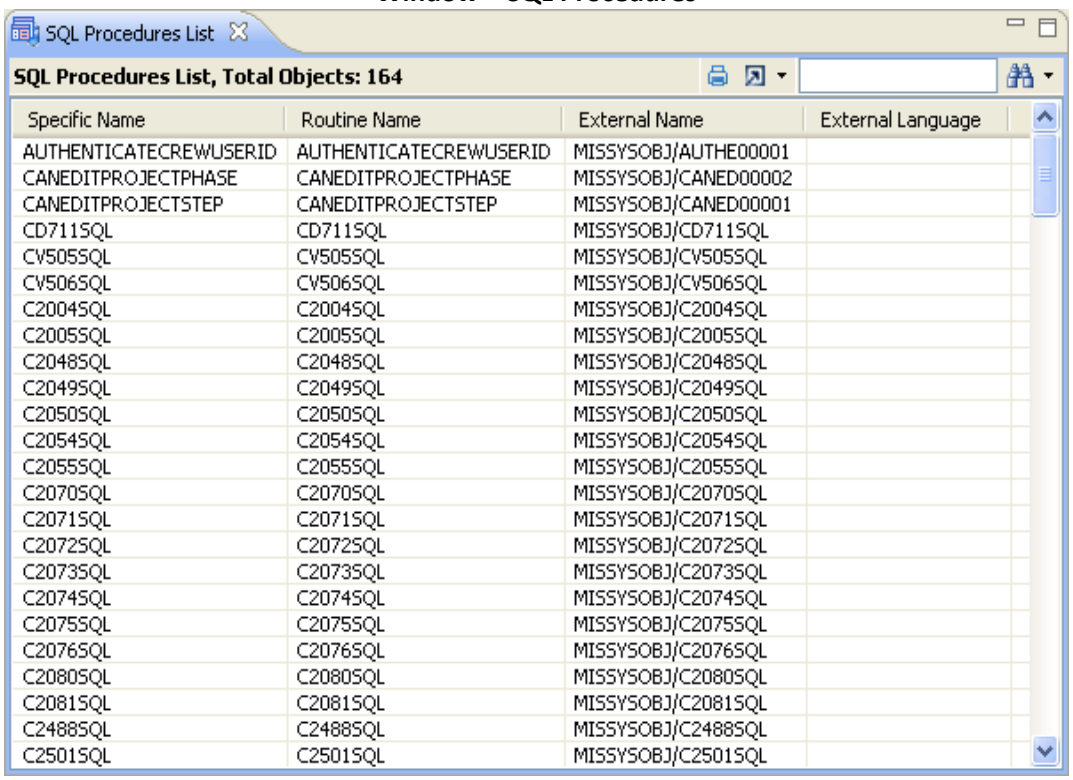
Specific Name	Routine Name	External Name	External Language
X@BWUDTA	X@BWUDTA	XAOBJ/X@BWUDTA	CL
XABGWUI	XABGWUI	XAOBJ/XABGWUI	CL
XACRTMLK	XACRTMLK	XAOBJ/XACRTMLK	CL
XADSPOJU	XADSPOJU	XAOBJ/XADSPOJU	CL
XADTARDR	XADTARDR	XAOBJ/XADTARDR	CL
XALWSRCBRW	XALWSRCBRW	XAOBJ/XALWSRCBRW	CL
XARRTVWD1	XARRTVWD1	XAOBJ/XARRTVWD	RPGLE
XBLDSCD	XBLDSCD	XAOBJ/XBLDSCD	RPGLE
XCHKLIB	XCHKLIB	XAOBJ/XCHKLIB	CL
XCRTLIB	XCRTLIB	XAOBJ/XCRTLIB	CL
XEXCCMD	XEXCCMD	XAOBJ/XEXCCMD	CL
XEXITJ	XEXITJ	XAOBJ/XEXITJ	RPGLE
XFNSPCMGRT	XFNSPCMGRT	XAOBJ/XFNSPCMGRT	CL
XFNSPCMGR1	XFNSPCMGR1	XAOBJ/XFNSPCMGRT	CL
XJVAINIT	XJVAINIT	XAOBJ/XJVAINIT	CL
XREFINUSE	XREFINUSE	XAOBJ/XREFINUSE	CL
XSCNRPTLYT	XSCNRPTLYT	XAOBJ/XSCNRPTLYT	CL
XSECCHK	XSECCHK	XAOBJ/XSECCHK	RPGLE
XSRVAPP	XSRVAPP	XAOBJ/XSRVAPP	RPGLE
XSRVSCD	XSRVSCD	XAOBJ/XSRVSCD	RPGLE
XWRKAS4JB1	XWRKAS4JB1	XAOBJ/XWRKAS4JOB	CL

SQL Procedures

The last option under the **Procedures** node is **SQL Procedures**. Select this option to present the entire procedure coded with SQL. The option follows SQL Standard (PSM) and allows 'normal' DDL/DML SQL, in addition to procedural statements.

The following window appears on selecting the **SQL Procedures** option:

Window – SQL Procedures



Specific Name	Routine Name	External Name	External Language
AUTHENTICATECREWUSERID	AUTHENTICATECREWUSERID	MISSYSOBJ/AUTHE00001	
CANEDITPROJECTPHASE	CANEDITPROJECTPHASE	MISSYSOBJ/CANED00002	
CANEDITPROJECTSTEP	CANEDITPROJECTSTEP	MISSYSOBJ/CANED00001	
CD711SQL	CD711SQL	MISSYSOBJ/CD711SQL	
CV505SQL	CV505SQL	MISSYSOBJ/CV505SQL	
CV506SQL	CV506SQL	MISSYSOBJ/CV506SQL	
C2004SQL	C2004SQL	MISSYSOBJ/C2004SQL	
C2005SQL	C2005SQL	MISSYSOBJ/C2005SQL	
C2048SQL	C2048SQL	MISSYSOBJ/C2048SQL	
C2049SQL	C2049SQL	MISSYSOBJ/C2049SQL	
C2050SQL	C2050SQL	MISSYSOBJ/C2050SQL	
C2054SQL	C2054SQL	MISSYSOBJ/C2054SQL	
C2055SQL	C2055SQL	MISSYSOBJ/C2055SQL	
C2070SQL	C2070SQL	MISSYSOBJ/C2070SQL	
C2071SQL	C2071SQL	MISSYSOBJ/C2071SQL	
C2072SQL	C2072SQL	MISSYSOBJ/C2072SQL	
C2073SQL	C2073SQL	MISSYSOBJ/C2073SQL	
C2074SQL	C2074SQL	MISSYSOBJ/C2074SQL	
C2075SQL	C2075SQL	MISSYSOBJ/C2075SQL	
C2076SQL	C2076SQL	MISSYSOBJ/C2076SQL	
C2080SQL	C2080SQL	MISSYSOBJ/C2080SQL	
C2081SQL	C2081SQL	MISSYSOBJ/C2081SQL	
C2488SQL	C2488SQL	MISSYSOBJ/C2488SQL	
C2501SQL	C2501SQL	MISSYSOBJ/C2501SQL	

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Application Area

ADD APPLICATION AREA

X-Analysis creates application areas from part of one or multiple systems. It is possible to programmatically subdivide an application into logical modules or areas. This can be within the context of a single system or specific parts from multiple systems. For example, you can have an application area like **ORDERS**, containing Order Entry details from Operational System, to represent single system Application Area. You can also have an application area as **ORDERS**, containing Order Entry details from Operational System and Sales Ledger details from Financial System, representing the application area as a specific part from multiple systems.

The Application Area feature facilitates the grouping of an application into different Business Areas. They are defined on the basis of certain criteria called Application Area Rules. Application Area Rules are, hence, a mechanism which categorizes an application into different Application Areas.

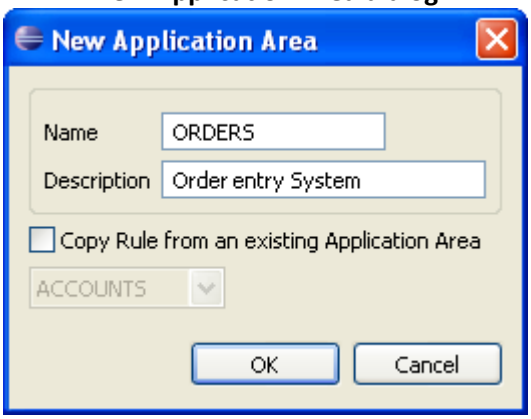
You can create an application area by running the X-Analysis Client or using **X4WRKAPP** on IBM i.

Using X-Analysis Plugin

Opt for the context menu on the cross-reference library. Then, select the **New Application Area** option. This brings up a dialog to add a new application area to the selected cross-reference library. The dialog takes the Application Area **Name** and **Description** as inputs.

Click **OK** to add the new application area to the cross-reference library.

New Application Area dialog



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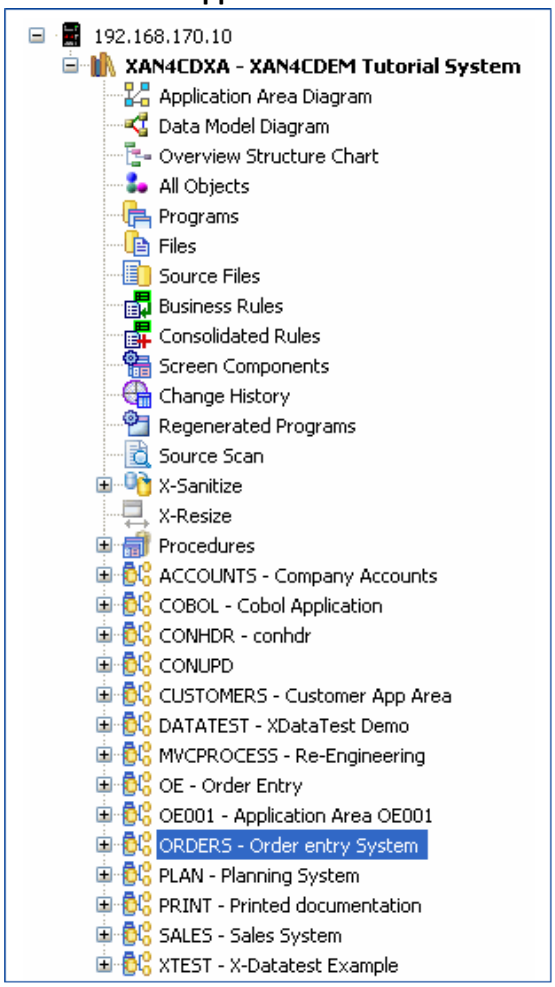
New Application Area added

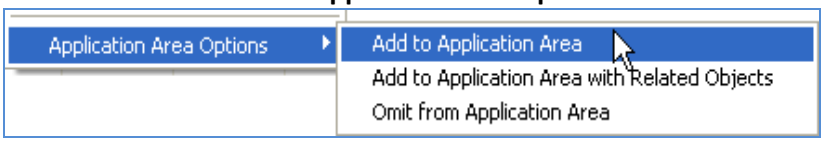


ADDING OBJECT TO AN APPLICATION AREA

Opt for the Object List to add an object to an application area. Double-click on the **All Objects** node brings up the **Work with Objects** dialog. Provide the object name to be added to the application area. For example, input **CON001** and click **OK**.

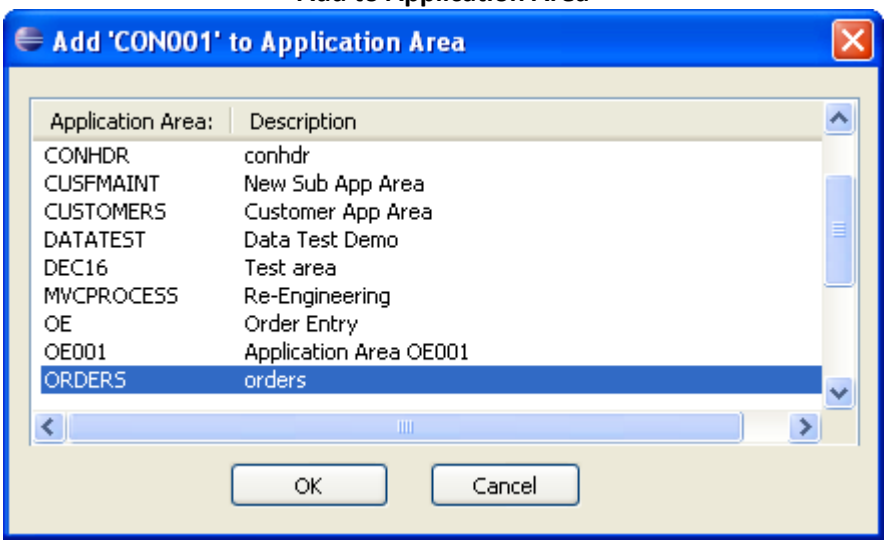
Select **CON001** and opt for the context menu on it. Then, select the **Add to Application Area** option, as shown below:

Add to Application Area option


Application Area Options
Add to Application Area
Add to Application Area with Related Objects
Omit from Application Area

This option presents the following dialog:

Add to Application Area



Select the application area in which you want to add the object and click **OK**.

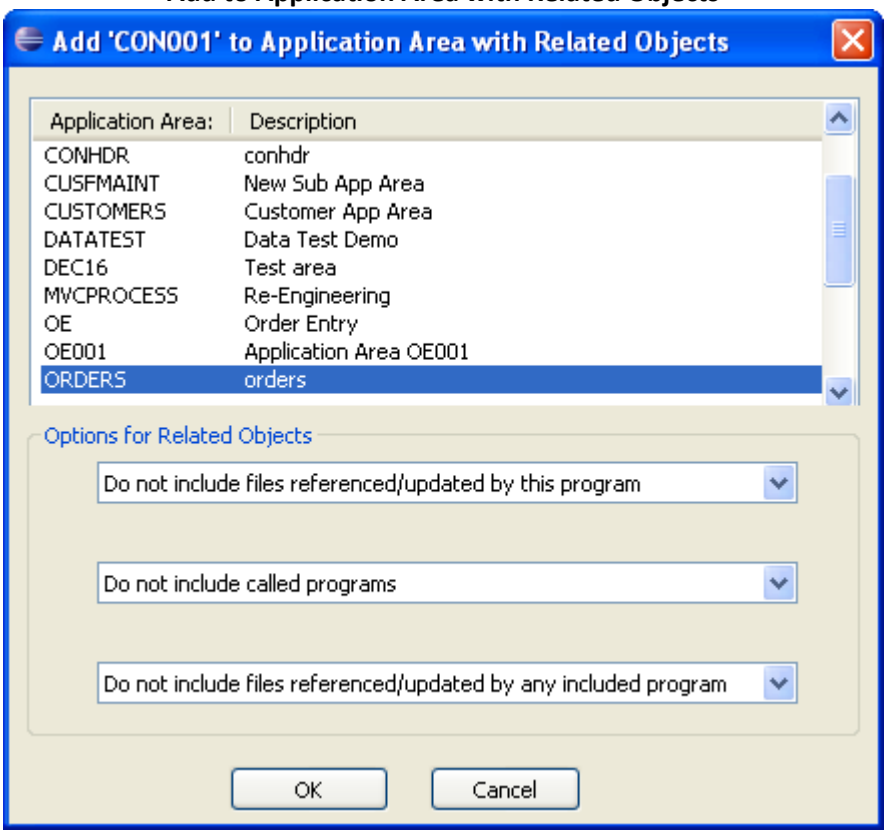
To add the related objects, select the second option i.e. **Add to Application Area with Related Objects** from the context menu, as shown below:

Add to Application Area with Related Objects option

Application Area Options
Add to Application Area
Add to Application Area with Related Objects
Omit from Application Area

This option invokes the following dialog:

Add to Application Area with Related Objects



Perform the steps given below:

1. Select the application area in which you want to add the object.
2. Choose the required options from the three drop-down menus.
3. Click **OK**.

This adds the objects to the application area fulfilling the criterions.

Removing Object from an Application Area

Opt for the Object List. Select the object to be removed from the application area. Then, opt for the context menu on that object and select the **Omit from Application Area** option as displayed below:

Omit from Application Area option

Application Area Options
Add to Application Area
Add to Application Area with Related Objects
Omit from Application Area

The following dialog will be displayed:

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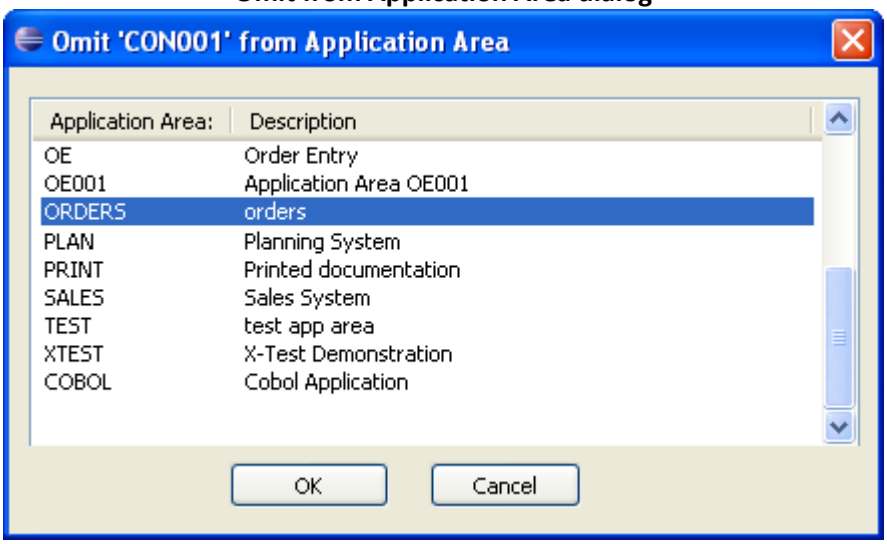
Omit from Application Area dialog

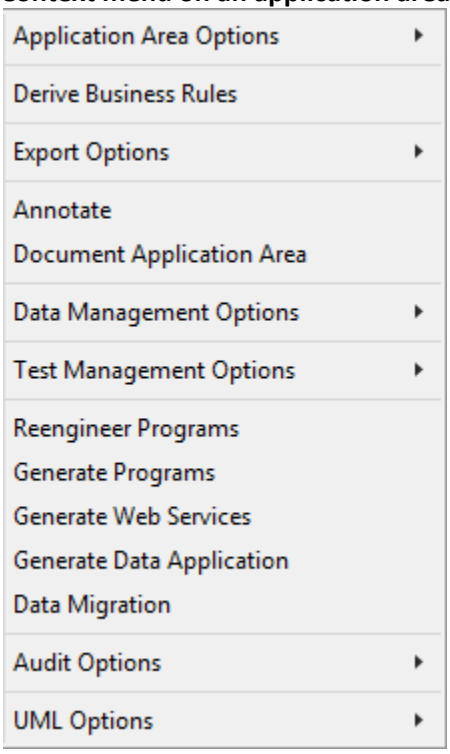


To remove the object, select the application area name and click **OK**.

Context Menu on an Application Area

The context menu on an application area is displayed below:

Context menu on an application area



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APPLICATION AREA OPTIONS

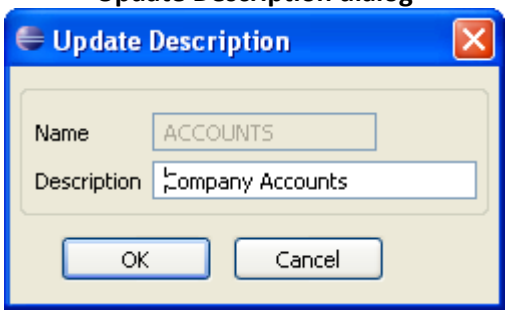
The **Application Area Options** sub-group consists of the following:

- Update Description
- Remove Application Area
- Application Area Rules
- Affinity Identification
- Affinity Comparison
- New Application Area
- Add to Application Area
- Omit from Application Area

Update Description

Select the **Update Description** option. This invokes a dialog which allows you to modify the application area description. Change the description and click **OK** to reflect the changes to the application area description.

Update Description dialog



Remove Application Area

Select the **Remove Application Area** option. This prompts for deleting the selected application area. If confirmed by the user, then it deletes the application area.

Application Area Rules

Select the Application Area Rules option. This invokes a window displaying the available 'Application Area Rules'. These rules determine which objects are to be placed in that particular Application Area. You may Update/Delete, or add new rules using the **Add**, **Delete**, and **Update** buttons at the bottom of the screen.

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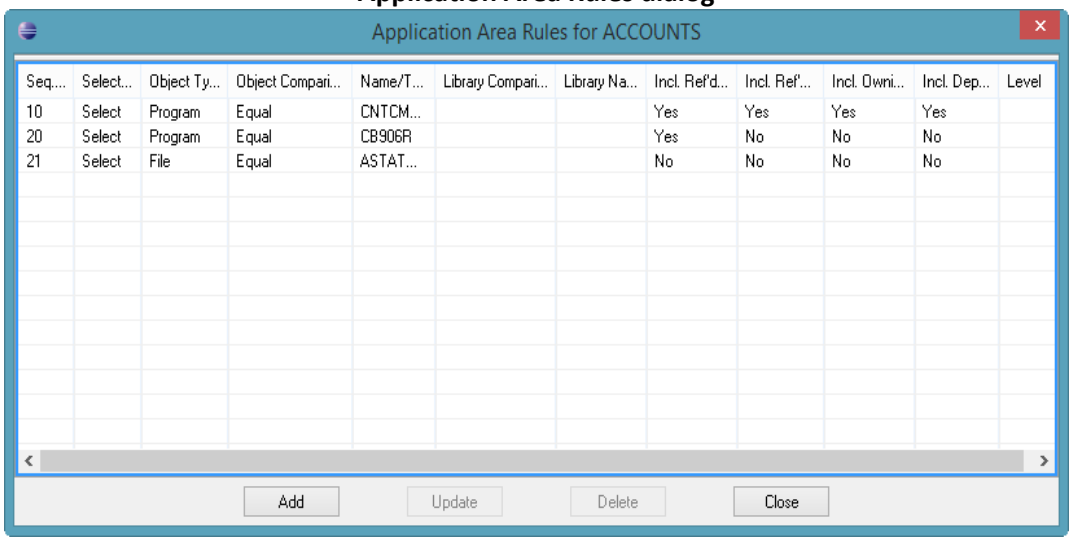
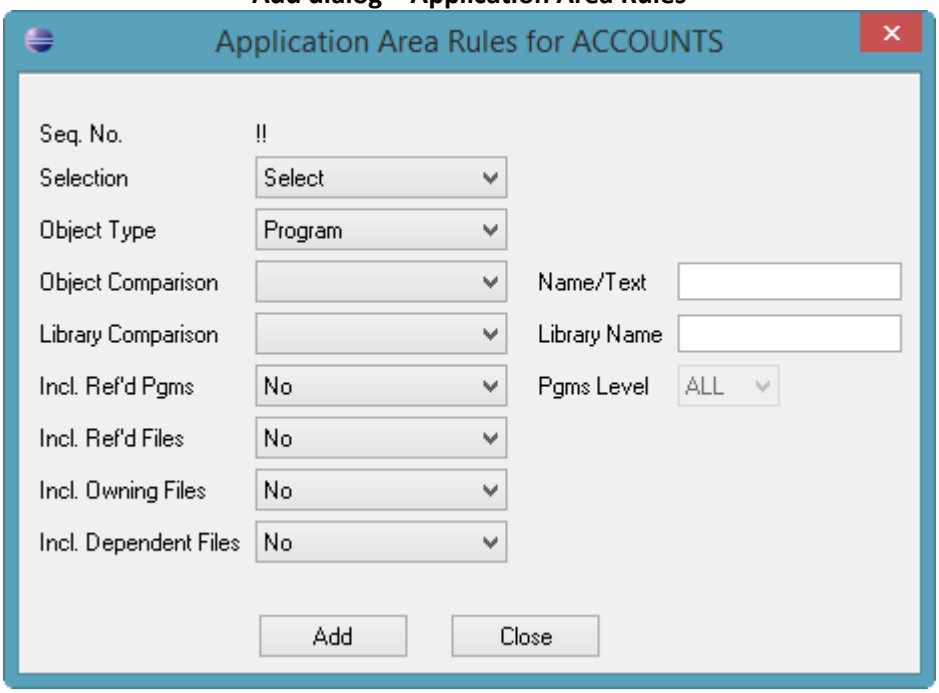
Application Area Rules dialog



Click **Add** to invoke the following dialog:

Add dialog – Application Area Rules



Make the appropriate selections in this dialog, for adding or modifying a rule for a specific application area. Note that **Pgms Level** from 2 to 9 can be specified only when you select **All** program references (or **All Batch Programs**) from the **Incl. Ref'd Pgms** drop-down. The default value for **Pgms Level** is **ALL** which brings the entire depth of the called programs.

Click **Add** or **Update** to complete the process.

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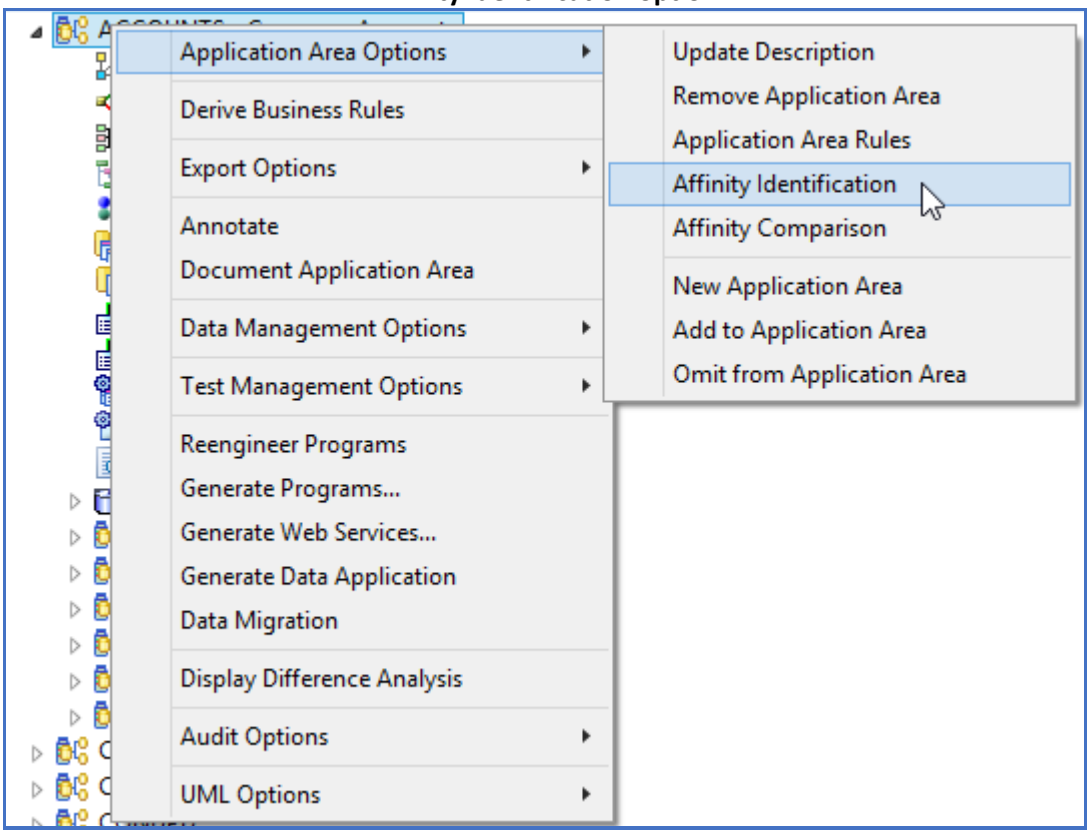
Affinity Identification

The **Affinity Identification** option displays the linkage of a program to another program and thereby helps to identify the objects that do not exist in an application area but have high (or low) affinity to one or multiple programs under that application area, mainly due to data linkages or program dependencies. The affinity calculation is done at the server using the **XAFFINIDX** command.

The **Affinity Identification** option is shown below:

Affinity Identification option



Select the option to generate a matrix of programs in the application area against the related program objects falling within or outside the selected application area. The affinity is displayed as shown in the following image.

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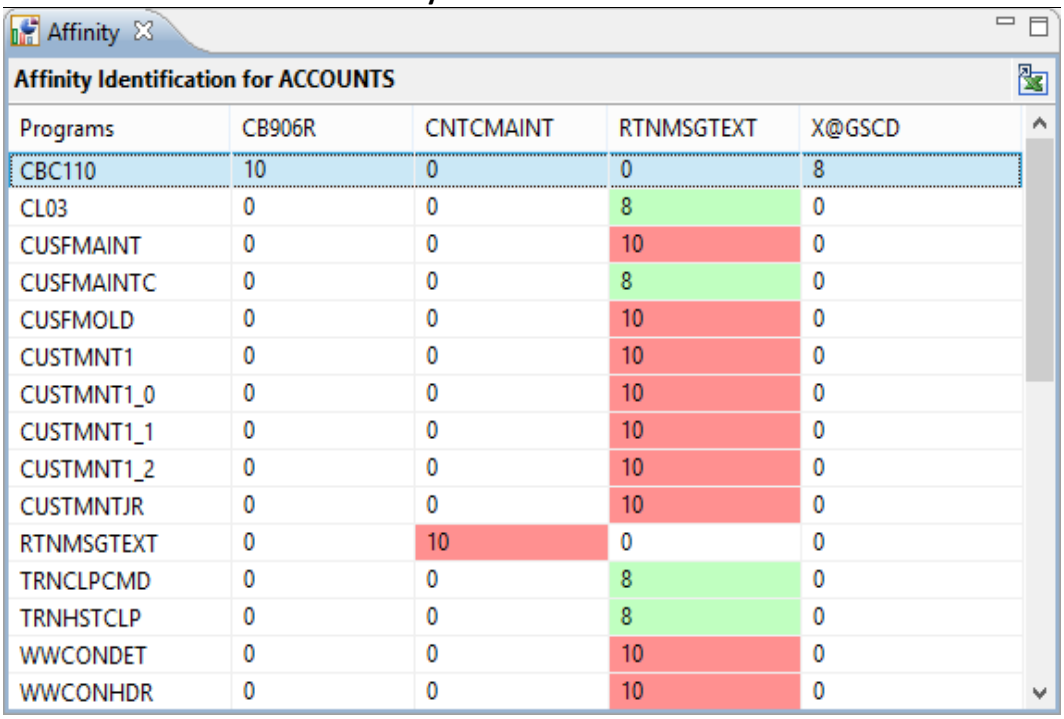
Affinity Identification window



Programs	CB906R	CNTCMAINT	RTNMSGTEXT	X@GSCD
CBC110	10	0	0	8
CL03	0	0	8	0
CUSFMAINT	0	0	10	0
CUSFMAINTC	0	0	8	0
CUSFMOLD	0	0	10	0
CUSTMNT1	0	0	10	0
CUSTMNT1_0	0	0	10	0
CUSTMNT1_1	0	0	10	0
CUSTMNT1_2	0	0	10	0
CUSTMNTJR	0	0	10	0
RTNMSGTEXT	0	10	0	0
TRNCLPCMD	0	0	8	0
TRNHSTCLP	0	0	8	0
WWCONDET	0	0	10	0
WWCONHDR	0	0	10	0

Two colors denote the affinity index of the programs with all the objects under the selected application area.

- Red – denotes above average Affinity Index.
- Green – denotes below average Affinity Index.

The above calculation is done based on the criteria below:

1. The program to program dependency at the specific depth in the calling sequence.
2. The common Database Files used in the specific pair of the programs.
3. Exactly Matching Business Rules.
4. Partially matching Business Rules.

The Affinity calculation is done considering the specific weightage for the above cases. The default calculation settings are shown below (i.e. in "Affinity Index" column):

Type	Level/Depth	Affinity Index
PGM	1	10
PGM	2	8
PGM	3	6
PGM	4	4
PGM	5	2
PGM	6	2
FILE	N/A	10
BizRIe	Exact Match	3
BizRIe	Contained	1

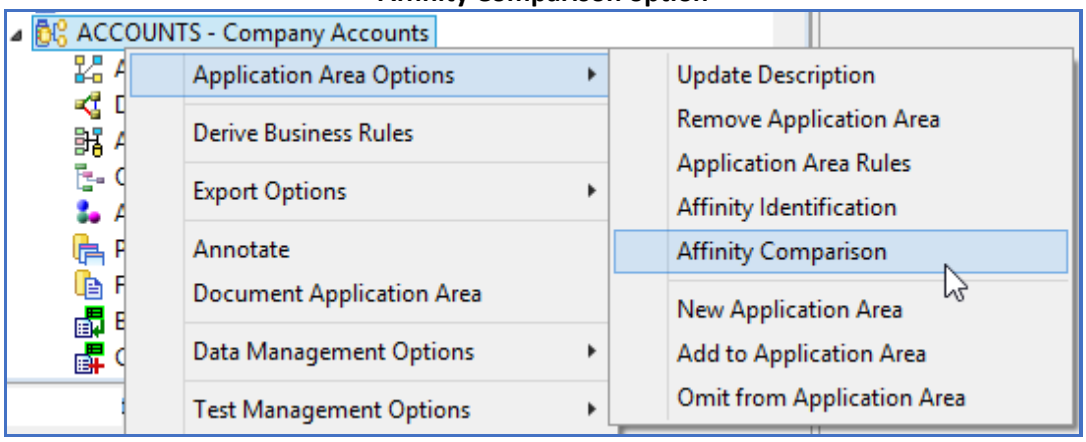
Note: The Affinity Identification report can also be exported to MS Excel.

Affinity Comparison

Select the Affinity Comparison option at the application area level to display the comparison of affinity values for all the objects present in that application area versus their affinity in other application areas.

The following image shows the **Affinity Comparison** option.

Affinity Comparison option



The following window will be invoked when the option is selected.

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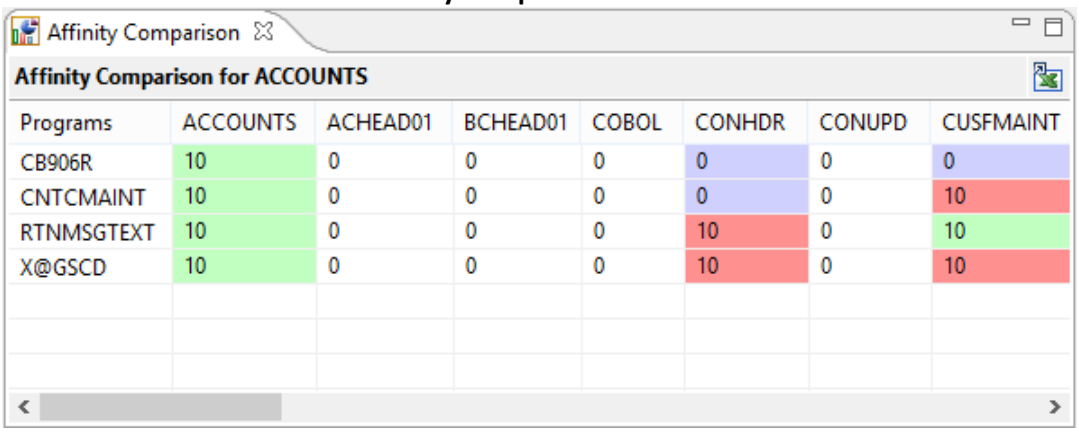
Affinity Comparison window



Programs	ACCOUNTS	ACHEAD01	BCHEAD01	COBOL	CONHDR	CONUPD	CUSFMAINT
CB906R	10	0	0	0	0	0	0
CNTCMAINT	10	0	0	0	0	0	10
RTNMSGTEXT	10	0	0	0	10	0	10
X@GSCD	10	0	0	0	10	0	10

The first column displays the selected application area and rest of the columns are the other app areas in X-Ref library.

The blue color in a specific cell (showing affinity value) represents the presence of that object in the application area corresponding to that column; red color means the object does not exist in the application area but has the highest affinity; green color represents the specific object has highest affinity and is also present in that application area.

Derive Business Rules

The topic has been discussed under the Application Library section.

Export Options

The topic has been discussed under the Application Library section.

Annotate

X-Analysis provides a facility of annotation for application areas. Select any application area and opt for the context menu on it, then select the **Annotate** option. This invokes a dialog box; provide the required text and click **Save**. The annotation is stored in a table available in the cross-reference library.

Document Application Area

We will discuss it under the Document Manager section.

Data Management Options

This submenu has the following options:

- Verify Data Relationships

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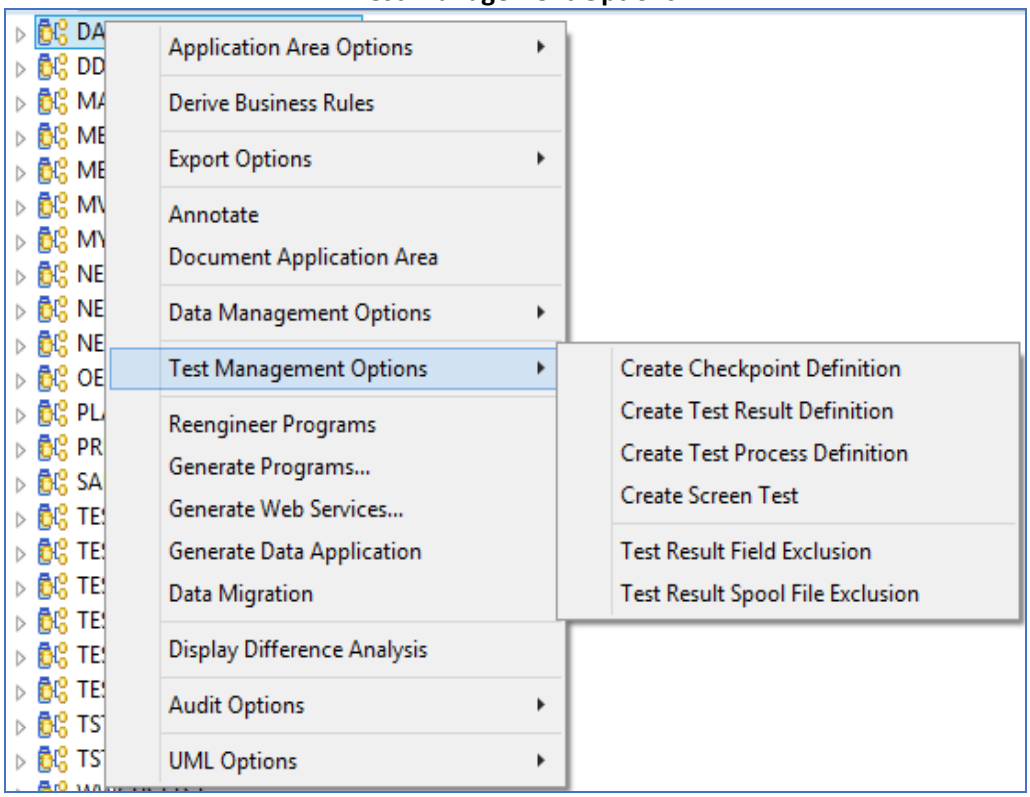
- Subset/Archive Filter
- Subset Data
- Archive Data
- Purge Data
- Archive & Purge Data

We shall discuss these options under the Data Management Features section.

TEST MANAGEMENT OPTIONS

This context menu contains various options related to X-Test. The following screen displays the options:

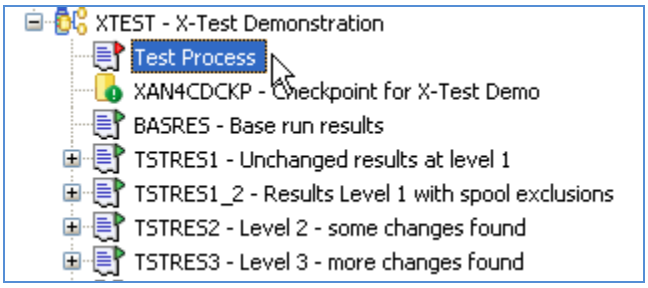
Test Management Options



Create Test Process Definition

The **Create Test Process Definition** is used to define the test process. It creates **Test Process** node under the application area. The following screen displays the available Test Process node; it comes pre-configured with the tutorial application – **XAN4CDXA**.

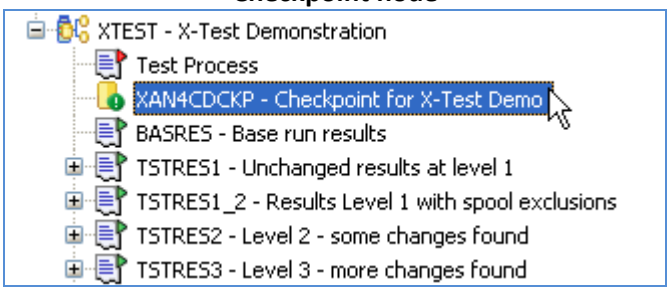
Test Process node


XTEST - X-Test Demonstration
Test Process
XAN4CDCKP - Checkpoint for X-Test Demo
BASRES - Base run results
TSTRES1 - Unchanged results at level 1
TSTRES1_2 - Results Level 1 with spool exclusions
TSTRES2 - Level 2 - some changes found
TSTRES3 - Level 3 - more changes found

Create Checkpoint Definition

This option is used to create checkpoints. The checkpoint acts as an image of the test data. The tutorial application has a pre-defined checkpoint – **XAN4CDCKP**. The following screen displays the checkpoint:

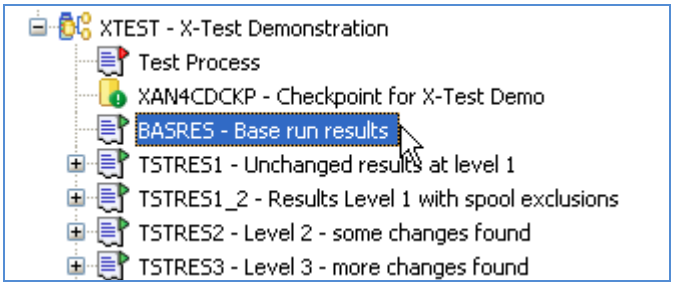
Checkpoint node


XTEST - X-Test Demonstration
Test Process
XAN4CDCKP - Checkpoint for X-Test Demo
BASRES - Base run results
TSTRES1 - Unchanged results at level 1
TSTRES1_2 - Results Level 1 with spool exclusions
TSTRES2 - Level 2 - some changes found
TSTRES3 - Level 3 - more changes found

Create Test Result Definition

We create the **Test Result Definition** in order to save the test process results. The tutorial application is pre-configured to have a Test Result Definition – **BASRES**. The following screen displays the test result definition:

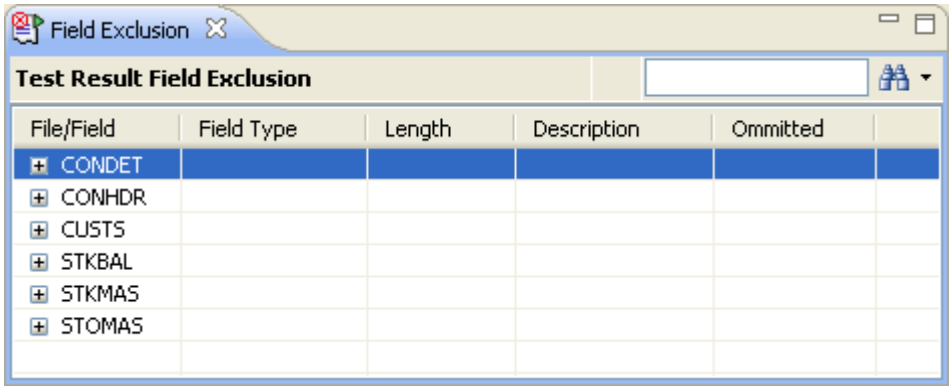
Test Result node


XTEST - X-Test Demonstration
Test Process
XAN4CDCKP - Checkpoint for X-Test Demo
BASRES - Base run results
TSTRES1 - Unchanged results at level 1
TSTRES1_2 - Results Level 1 with spool exclusions
TSTRES2 - Level 2 - some changes found
TSTRES3 - Level 3 - more changes found

Test Result Field Exclusion

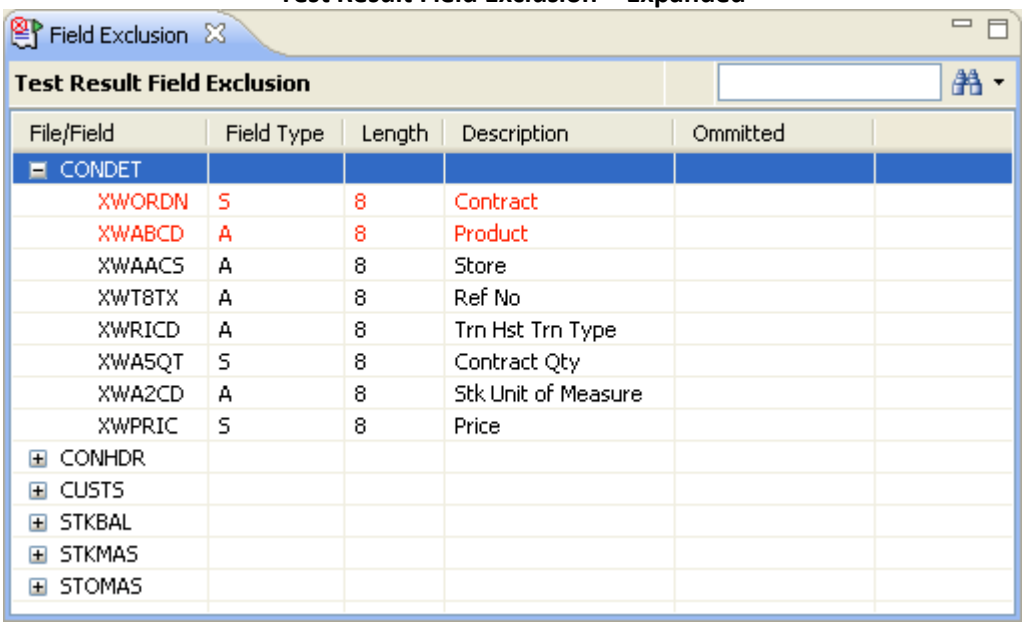
This option lists all the files (PFs) under the application area, so that you can select any field for exclusion purpose. The following screen displays the field exclusion window:

Test Result Field Exclusion



Expand a file to display the fields of that file.

Test Result Field Exclusion – Expanded



The keyed fields are displayed in RED. To exclude a field, select any field other than the keyed fields and opt for the context menu:

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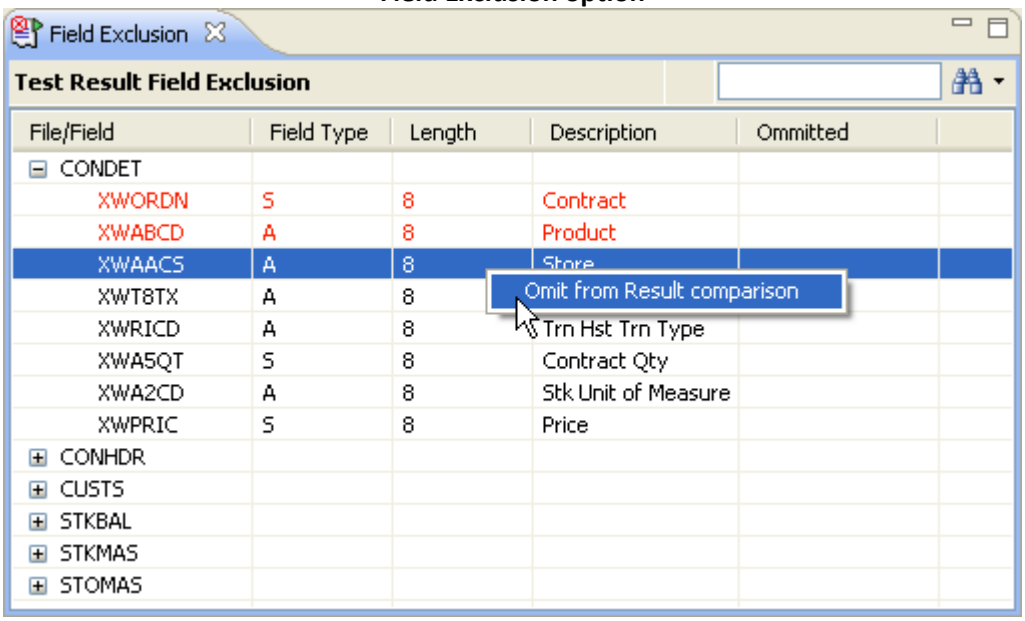
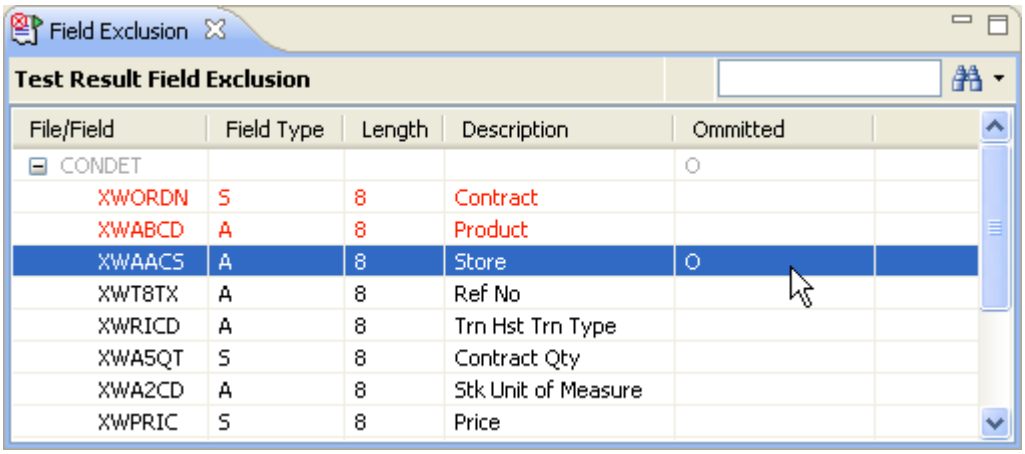
Field Exclusion option



On selecting the exclusion option, **Omit from Result comparison**, the window gets updated and starts displaying **O** against the omitted field, as displayed below:

Omitted Field



In order to clear field omission, select the omitted field and select the **Clear Criteria** option from the context menu.

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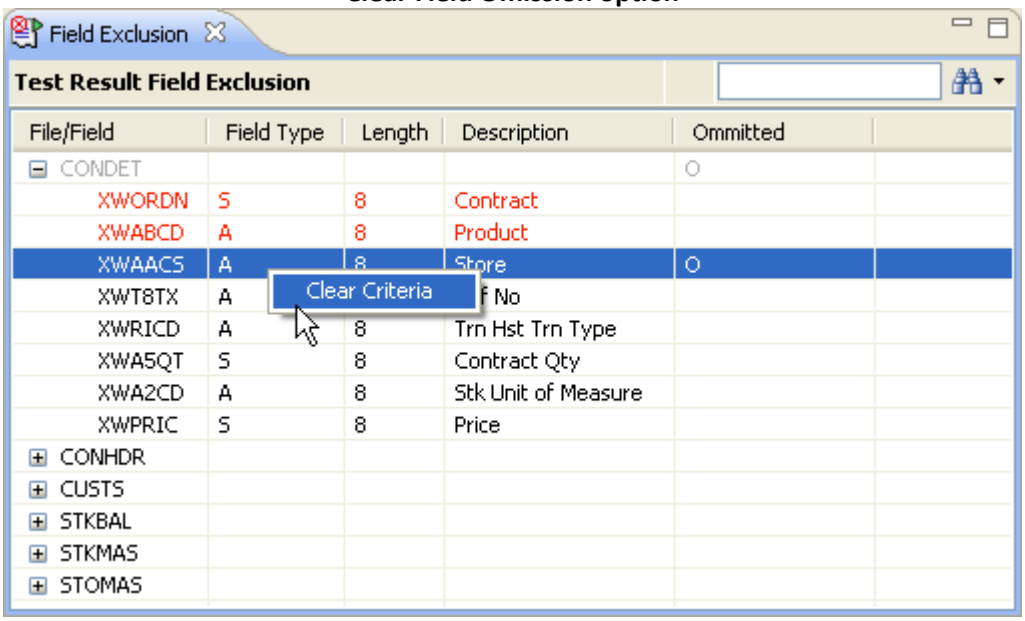
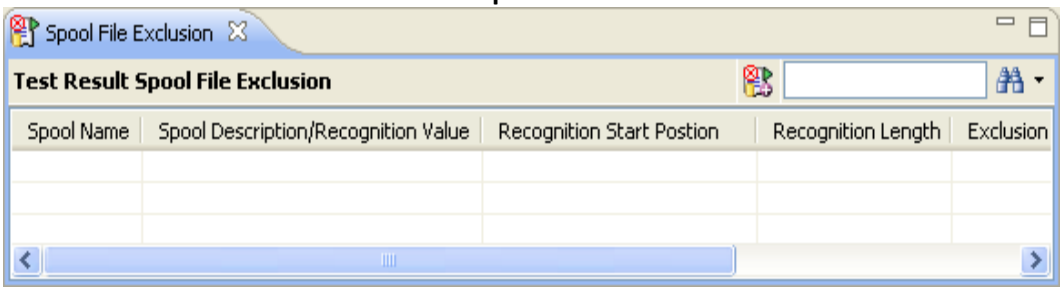
Clear Field Omission option



Test Result Spool File Exclusion

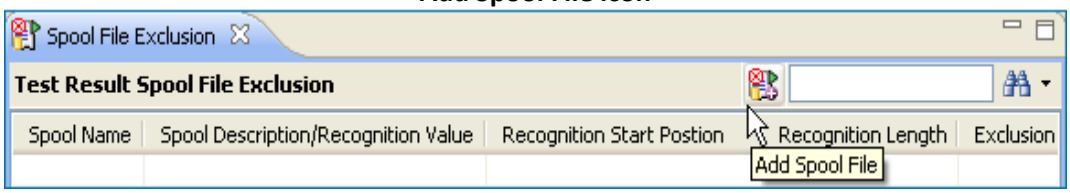
There are some fields that may 'pollute' the test results during the test data comparison process. The **Test Result Spool File Exclusion** option helps you to exclude such polluted fields. On selecting this option, you will invoke a new window for Spool File Exclusion. The following screenshot displays the Spool File Exclusion window:

Window – Spool File Exclusion



You can add a new spool file by clicking the **Add Spool File** icon, as shown below:

Add Spool File icon



The following dialog box is invoked:

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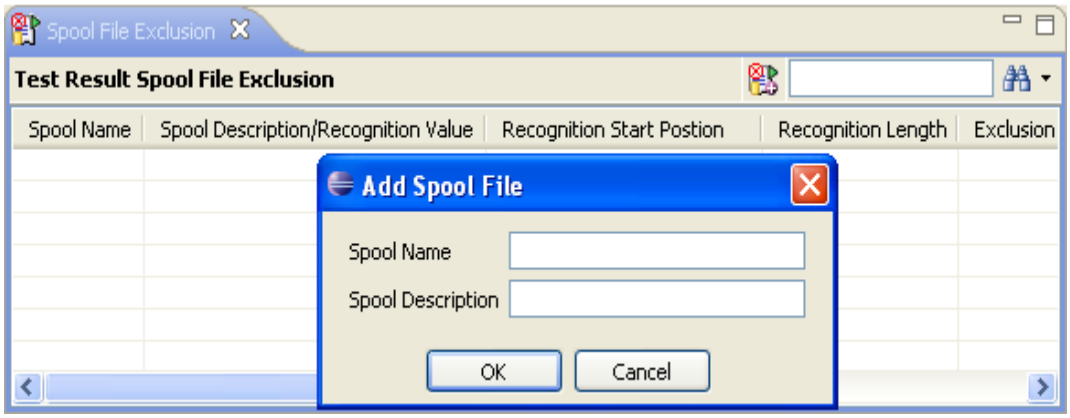
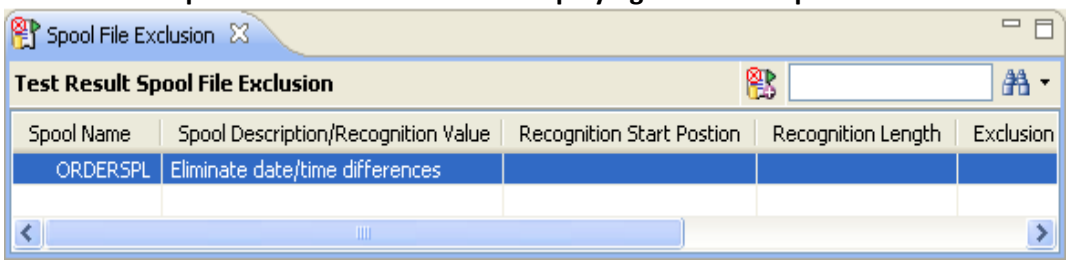
Dialog – Add Spool File



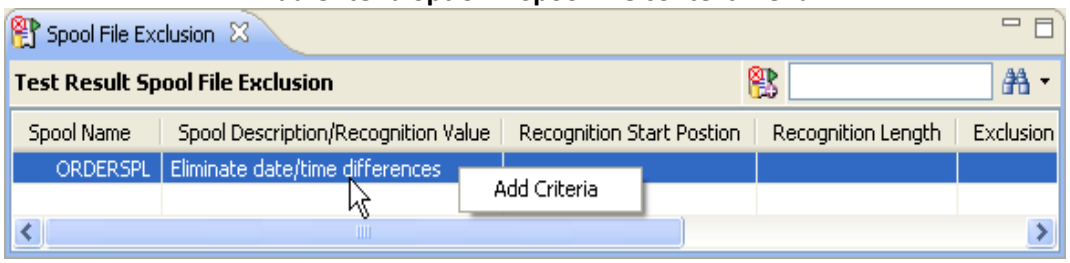
Provide the **Spool Name** and the **Spool Description** in the above dialog. Clicking **OK** to add the Spool File to the Spool File Exclusion window. In the following screenshot, the added Spool File is displayed:

Spool File Exclusion window displaying the added Spool File



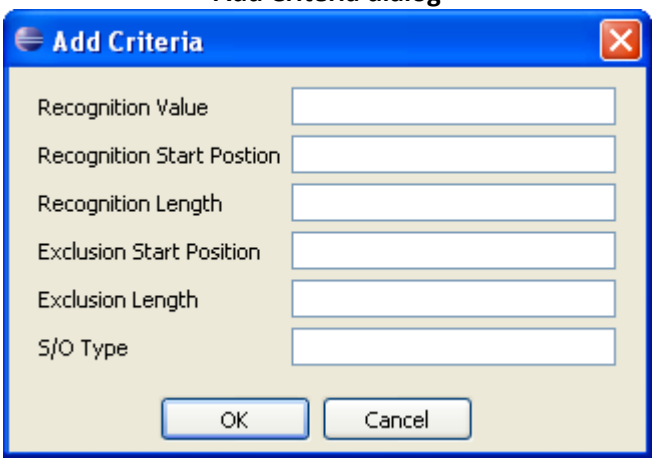
The next step will be to add exclusion criteria to the spool file. For this, select the spool file and right-click on it for the context menu. The menu contains a single option called **Add Criteria**.

Add Criteria option – Spool File context menu



Click the **Add Criteria** option to invoke the following dialog:

Add Criteria dialog



Provide the necessary criterions in the dialog box and click **OK**. This will add the criterions under the selected Spool File in the Spool File Exclusion window. Follow the same sequence of steps to add more Spool Files as per requirement.

For more details, refer to the X-DataTest User Manual.

REENGINEER PROGRAMS

Refer to the Reengineer Programs section.

GENERATE PROGRAMS

Refer to the Generate Programs section.

AUDIT OPTIONS

For detailed description, refer to the Audit Options section given below.

UML OPTIONS

The **UML Options** menu has the following two options:

- Re-generate UML
- View App Area Class Diagram

Re-generate UML

The **Re-generate UML** option is specific to application areas. When a user selects this option, then both the UML diagrams – Activity and Class diagrams are re-generated for the selected application area. When the process is over, the following dialog is displayed:

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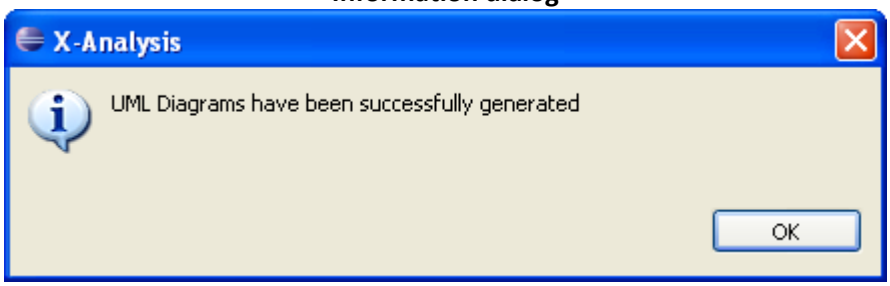
Information dialog

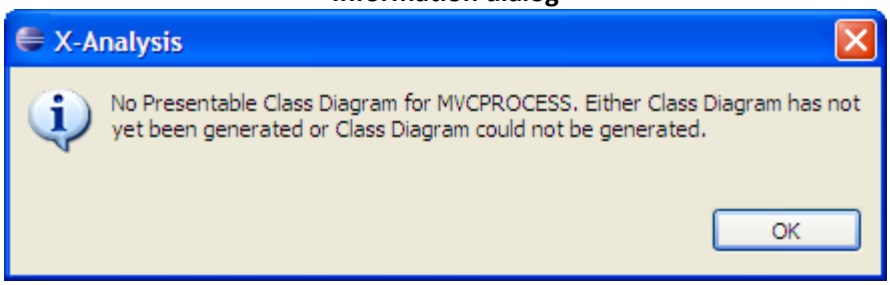


View App Area Class Diagram

The **View App Area Class Diagram** option is specific to application areas. This is a special class diagram which displays all the objects available in the application area.

The following dialog is displayed when either the class diagram does not exist or the UML diagrams were not generated for the application area:

Information dialog


X-Analysis
No Presentable Class Diagram for MVCPROCESS. Either Class Diagram has not yet been generated or Class Diagram could not be generated.
OK

In order to view the class diagram for the application area, you must execute the **Re-generate UML** option.

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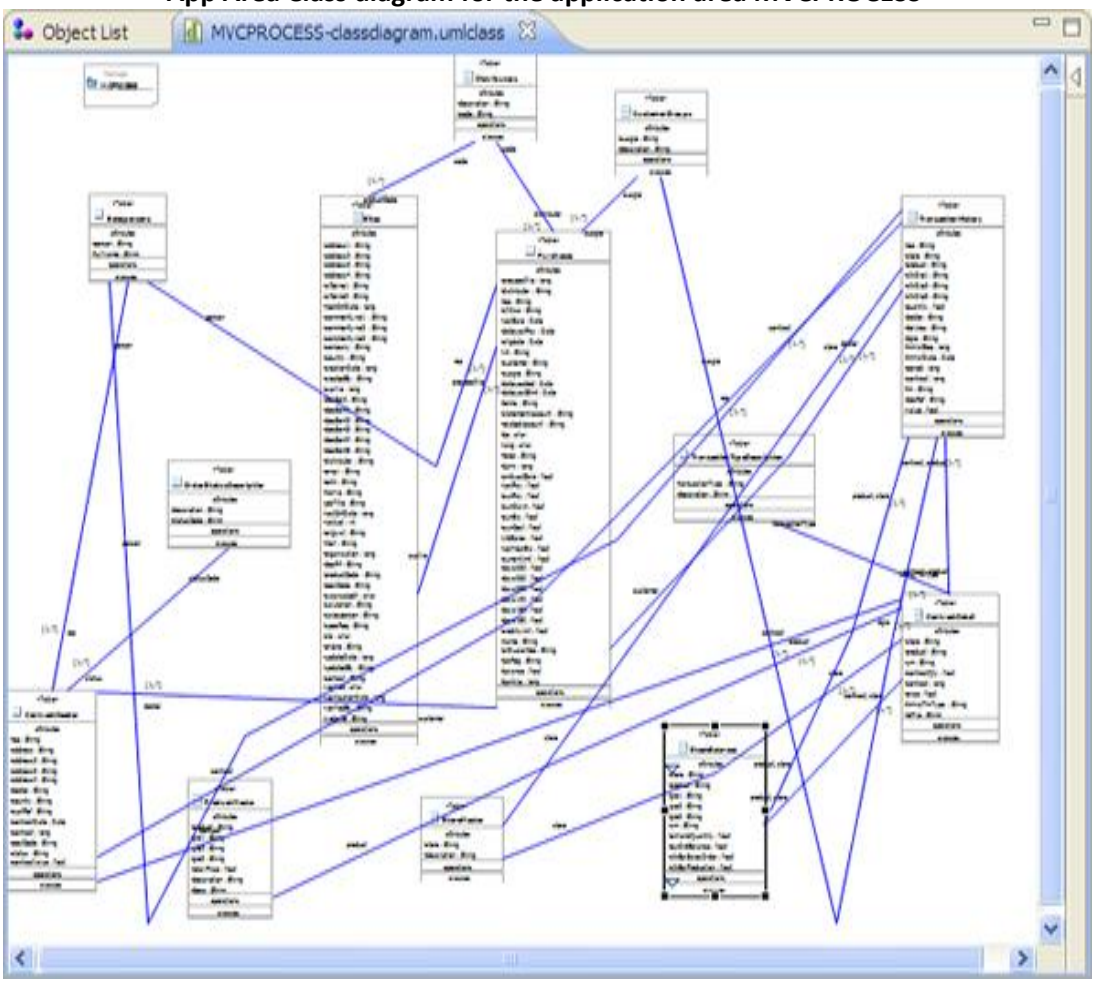
App Area Class diagram for the application area MVCPROCESS



DDL Modernization node on an Application Area

The conversion of DDS into DDL is intended for the clients planning to modernize their databases to get the enhanced DDL features. Below are some of the benefits:

1. Better data integrity (data validation is performed at Write/Update, unlike in DDS where the validation is performed on a read)

2. Access to new data types not supported in DDS (identity columns, BLOBs, CLOBs, DataLinks etc.)

3. Better read performance.

DDS to DDL – X-Analysis

In X-Analysis, enhancing the maintainability of databases by converting from DDS to DDL can be achieved via the **DDL Modernization** node. This feature is only available under the

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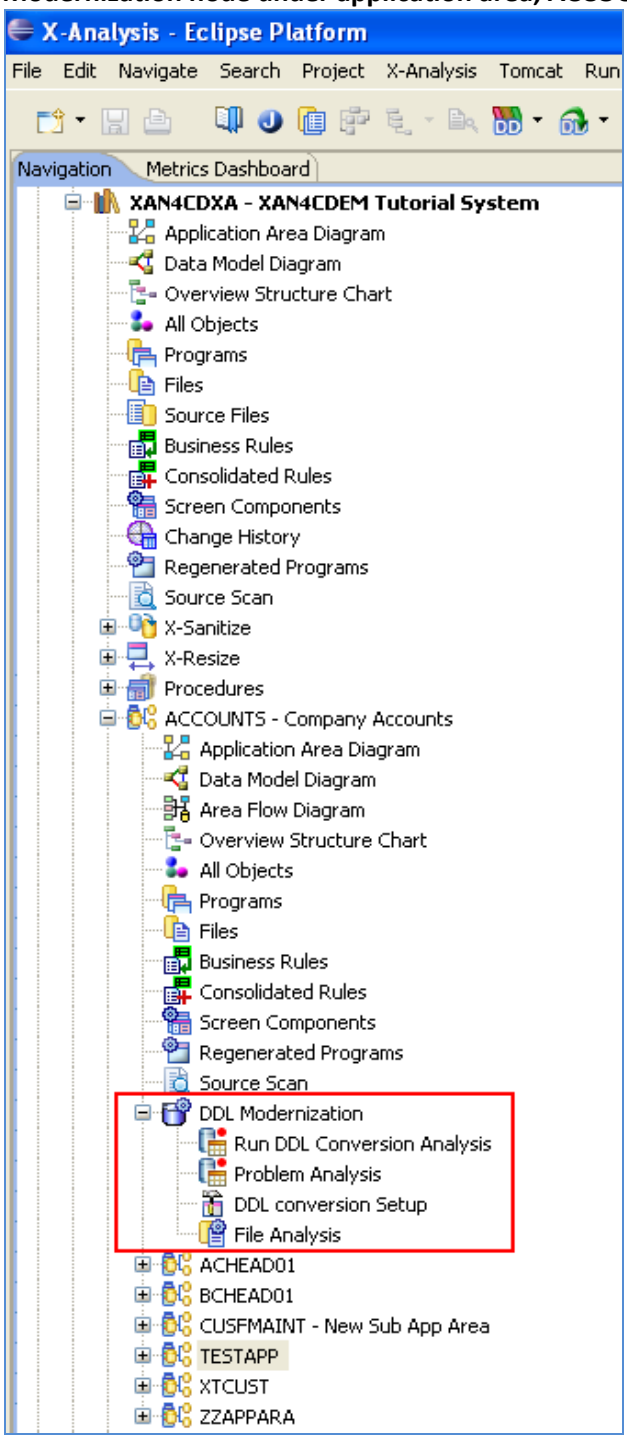
application areas. When an application area under an X-Ref library is expanded, the **DDL Modernization** node appears under it as shown below:

DDL Modernization node under application area, ACCOUNTS



There are four sub-nodes under the **DDL Modernization** node. These are:

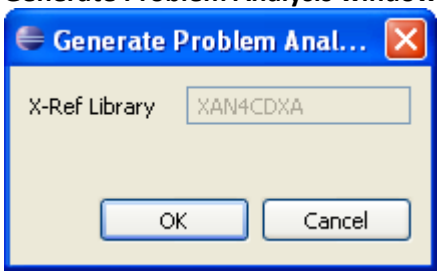
- Run DDL Conversion Analysis
- Problem Analysis
- DDL conversion Setup
- File Analysis

Note: It is vital that any PFs or LFs that are converted have the same format level identifiers as the original in order to prevent repetitive level checks.

Run DDL Conversion Analysis

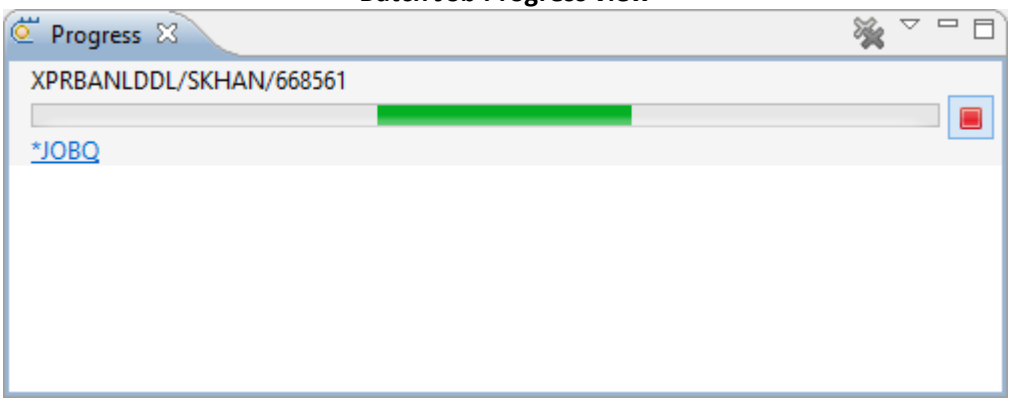
Select this option to invoke the following dialog:

Generate Problem Analysis window



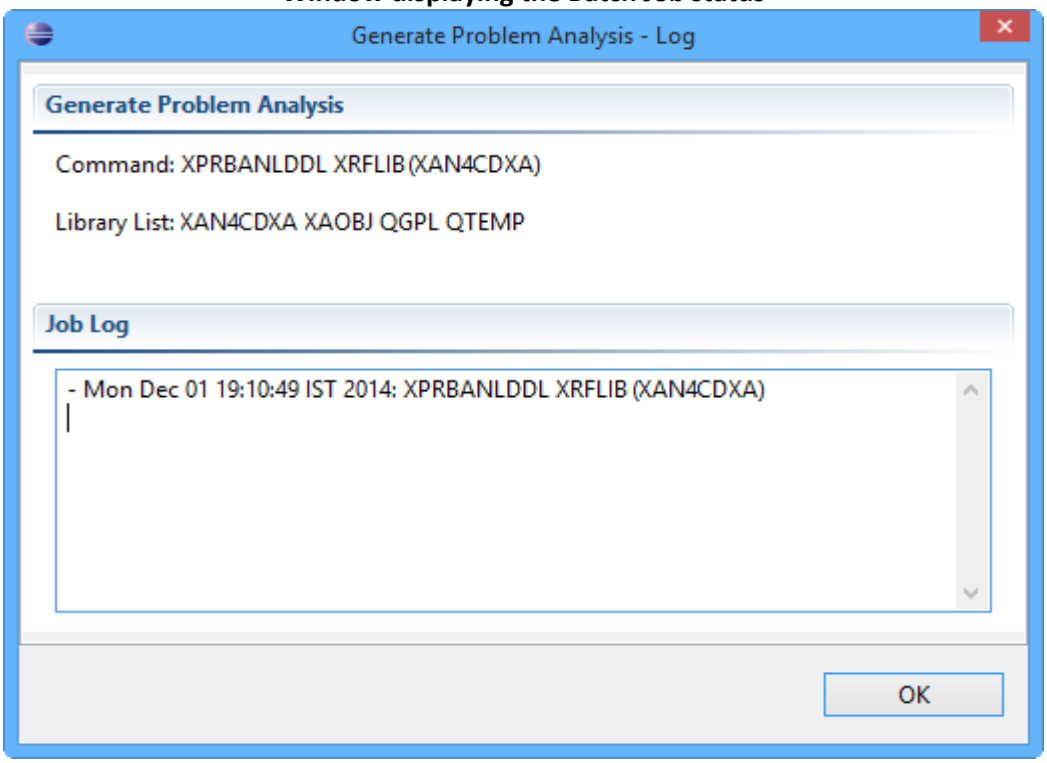
Click **OK** to submit a batch job. The following window displays the progress of the batch job.

Batch Job Progress view



At any point, while the batch job is running, click on the hyperlink (*JOBQ) to view the Job Log. The Job Log view is shown below:

Window displaying the Batch Job status

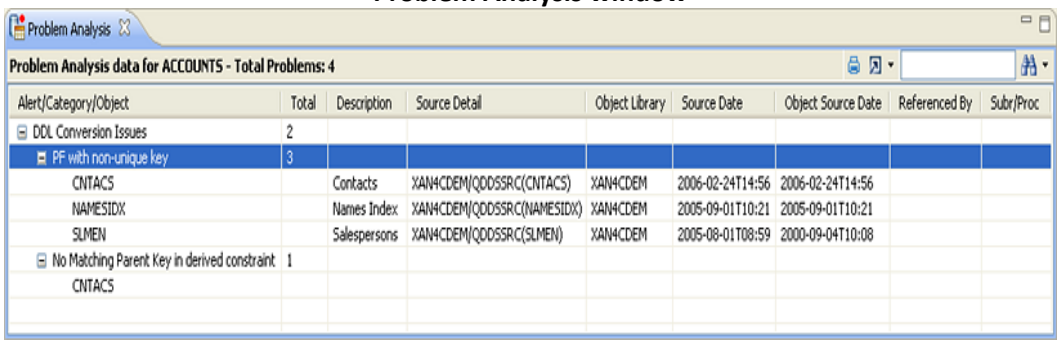

Generate Problem Analysis - Log
Generate Problem Analysis
Command: XPRBANLDDL XRFLIB(XAN4CDXA)
Library List: XAN4CDXA XAOBJ QGPL QTEMP
Job Log
- Mon Dec 01 19:10:49 IST 2014: XPRBANLDDL XRFLIB (XAN4CDXA)
OK

Problem Analysis

When you double-click on the **Problem Analysis** option, the following window is presented. The window contains specific information related to DDL conversion issues.

The image underneath presents the conversion issues (like PFs with non-unique key) for the application area, **ACCOUNTS**.

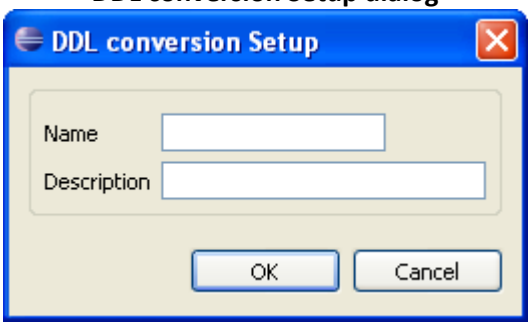
Problem Analysis window



DDL conversion Setup

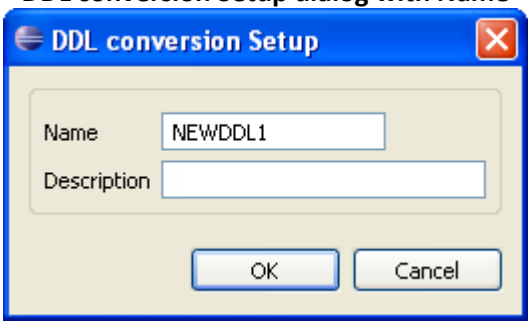
The **DDL conversion Setup** option allows you to formulate a new DDL conversion set up. Double-click this option to invoke the **DDL conversion Setup** dialog:

DDL conversion Setup dialog

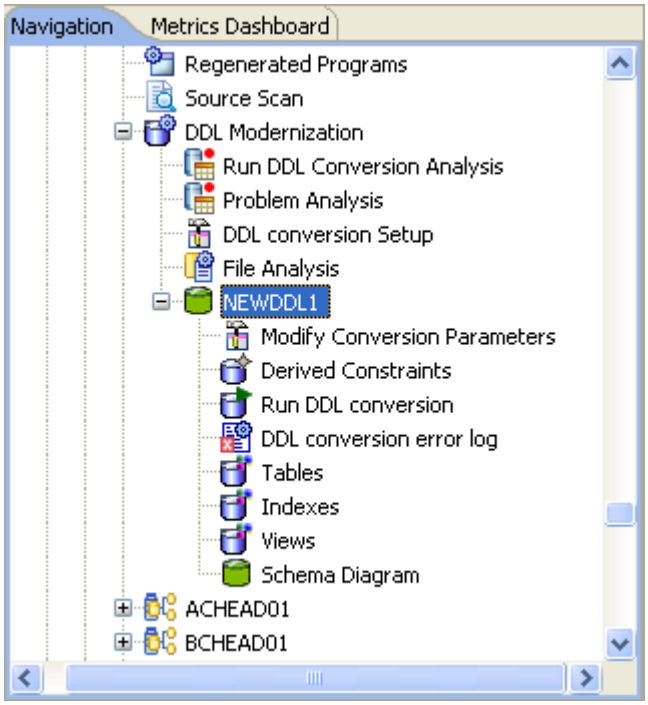


Provide the **Name** and **Description** (adding **Description** is optional). The following image shows the name of the new DDL set up.

DDL conversion Setup dialog with Name

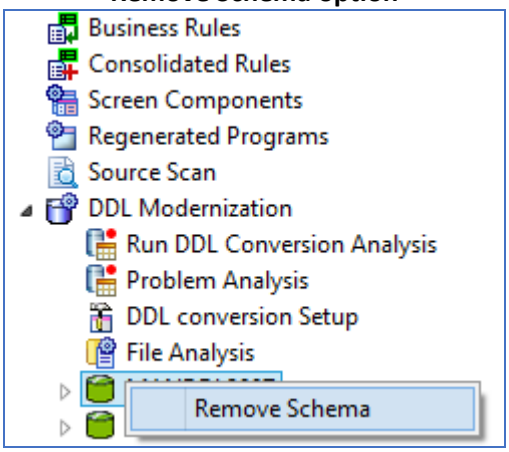


NEWDDL1 node



You can delete the **NEWDDL1** node by right-clicking and selecting the **Remove Schema** option. The option is shown in the following image.

Remove Schema option



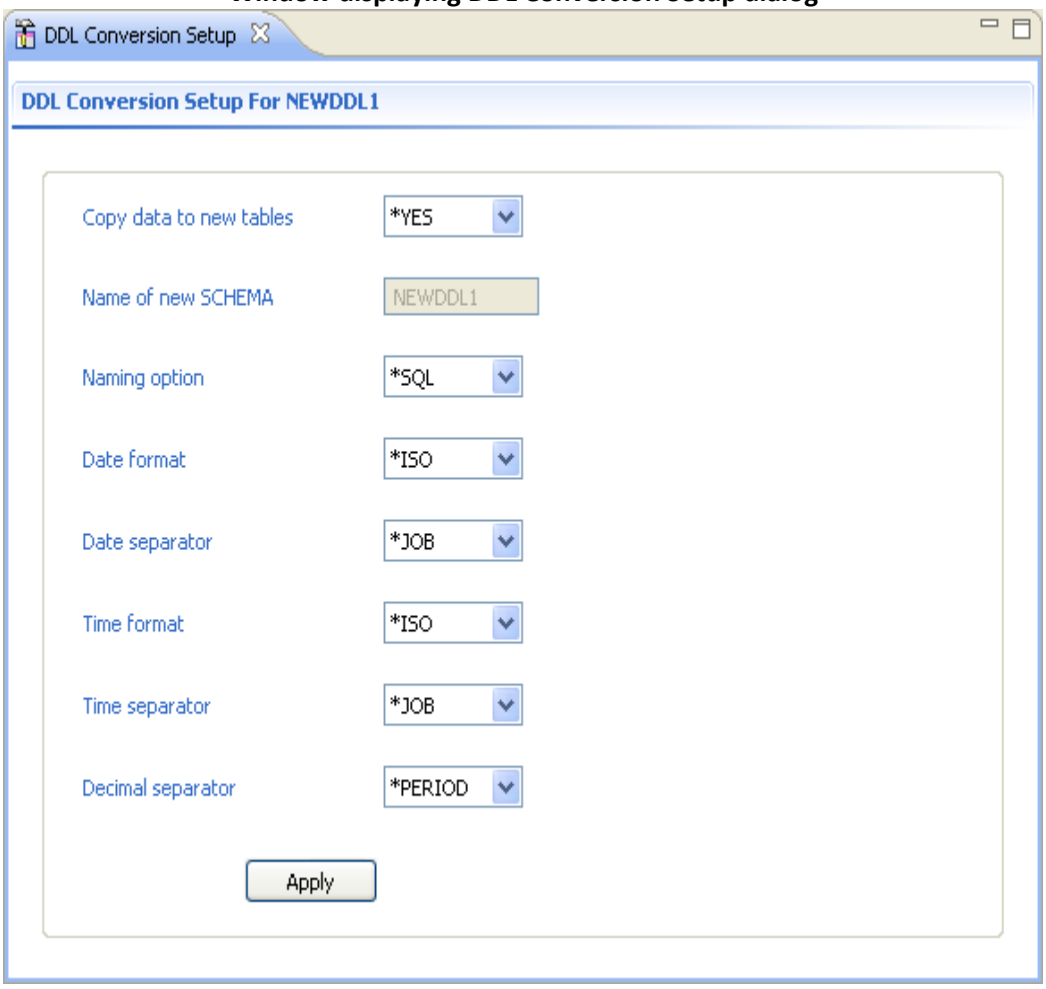
A confirmation dialog will appear asking you to confirm the deletion. The action removes the node from the Client UI and the table, although the schema library will continue to exist in the database and you must manually remove it.

The sub-nodes are discussed below:

Modify Conversion Parameters

When you double-click the **Modify Conversion Parameters** option, the following window is invoked.

Window displaying DDL Conversion Setup dialog



Modify the conversion parameters as per requirements. After modifying the parameters, click **Apply** to implement the changes.

Derived Constraints

Derived constraints are optionally generated during DDL modernization. These constraints are derived from the Data model.

The validity of the constraints is determined during problem analysis; the entries which are invalid are reported as usual in the **DDL Modernization->Problem Analysis** node.

Run DDL conversion

When you double-click on the **Run DDL conversion** option, the following dialog shows up:

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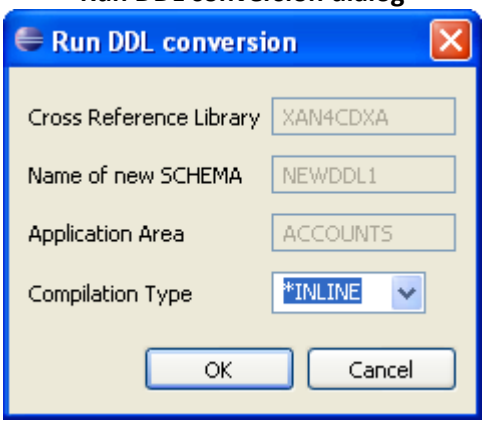
Run DDL conversion dialog



Choose the **Compilation Type** from the drop-down menu. The default option is ***INLINE**. Click **OK**.

DDL conversion error log

The **DDL conversion error log** lists the record of errors which occurred during the DDL conversion process.

Tables

Double-click the **Tables** sub-node to invoke the following window. It presents the names of all the Tables for **NEWDDL1**. Each table is also assigned a system table name.

Window displaying Tables for NEWDDL1

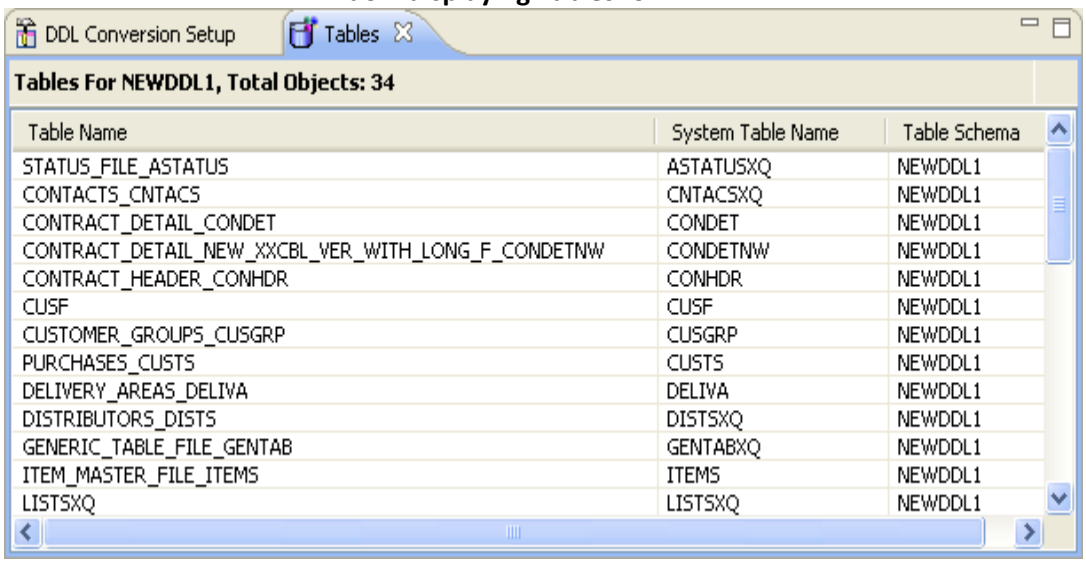


Table Name	System Table Name	Table Schema
STATUS_FILE_ASTATUS	ASTATUSXQ	NEWDDL1
CONTACTS_CNTACS	CNTACSXQ	NEWDDL1
CONTRACT_DETAIL_CONDET	CONDET	NEWDDL1
CONTRACT_DETAIL_NEW_XXCBL_VER_WITH_LONG_F_CONDETNW	CONDETNW	NEWDDL1
CONTRACT_HEADER_CONHDR	CONHDR	NEWDDL1
CUSF	CUSF	NEWDDL1
CUSTOMER_GROUPS_CUSGRP	CUSGRP	NEWDDL1
PURCHASES_CUSTS	CUSTS	NEWDDL1
DELIVERY_AREAS_DELIVA	DELIVA	NEWDDL1
DISTRIBUTORS_DISTS	DISTSXQ	NEWDDL1
GENERIC_TABLE_FILE_GENTAB	GENTABXQ	NEWDDL1
ITEM_MASTER_FILE_ITEMS	ITEMS	NEWDDL1
LISTSXQ	LISTSXQ	NEWDDL1

The table names have a right-click option, **Zoom Source** to invoke the Source List for that table. Select the **Zoom Source** option to invoke the following window:

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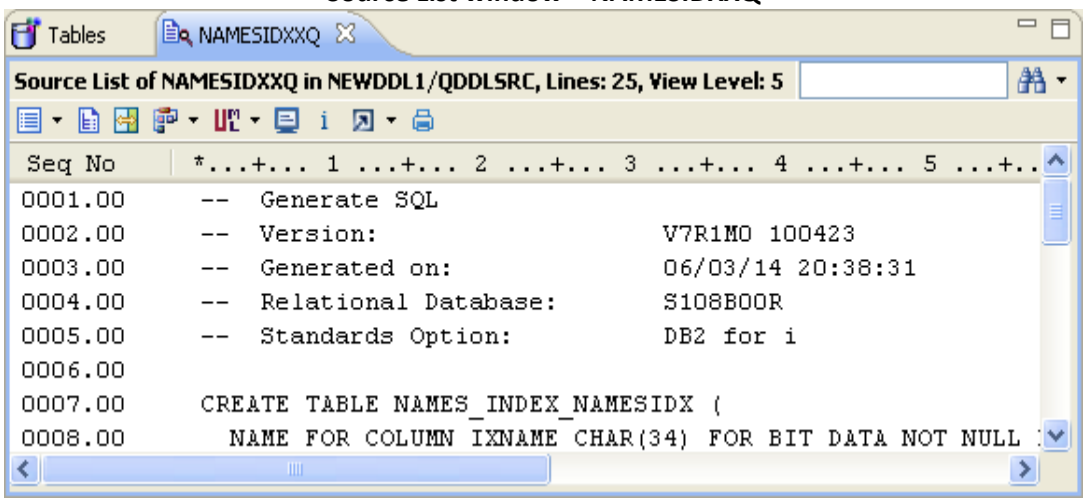
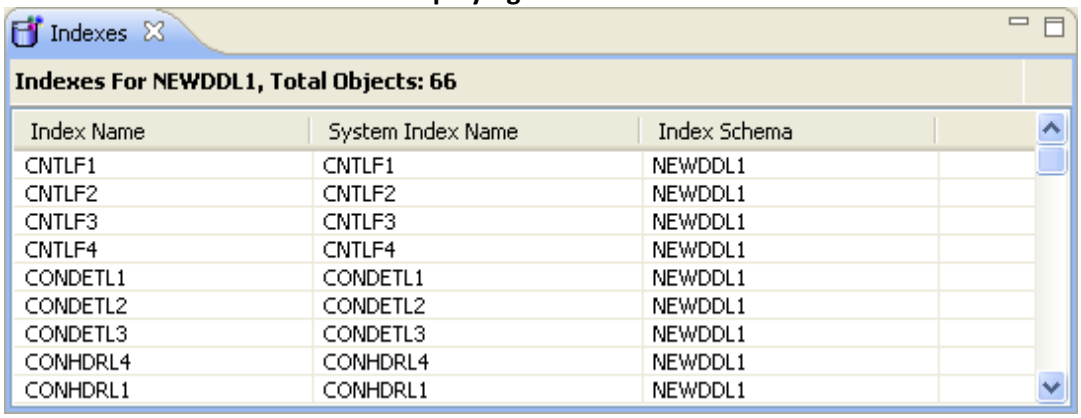
Source List window – NAMESIDXXQ


Tables
NAMESIDXXQ
Source List of NAMESIDXXQ in NEWDDL1/QDDLSRC, Lines: 25, View Level: 5
Seq No
*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+..
0001.00 -- Generate SQL
0002.00 -- Version: V7R1M0 100423
0003.00 -- Generated on: 06/03/14 20:38:31
0004.00 -- Relational Database: S108B00R
0005.00 -- Standards Option: DB2 for i
0006.00
0007.00 CREATE TABLE NAMES_INDEX_NAMESIDX (
0008.00 NAME FOR COLUMN IXNAME CHAR(34) FOR BIT DATA NOT NULL

Indexes

Double-click the **Indexes** sub-node to display the index names. Similar to the Tables, each index is assigned a System Index Name.

Window displaying Indexes for NEWDDL1



Index Name	System Index Name	Index Schema
CNTLF1	CNTLF1	NEWDDL1
CNTLF2	CNTLF2	NEWDDL1
CNTLF3	CNTLF3	NEWDDL1
CNTLF4	CNTLF4	NEWDDL1
CONDETL1	CONDETL1	NEWDDL1
CONDETL2	CONDETL2	NEWDDL1
CONDETL3	CONDETL3	NEWDDL1
CONHDRL4	CONHDRL4	NEWDDL1
CONHDRL1	CONHDRL1	NEWDDL1

Right-click on an index name to invoke the **Zoom Source** option. The following image shows the Source List for a selected Index name:

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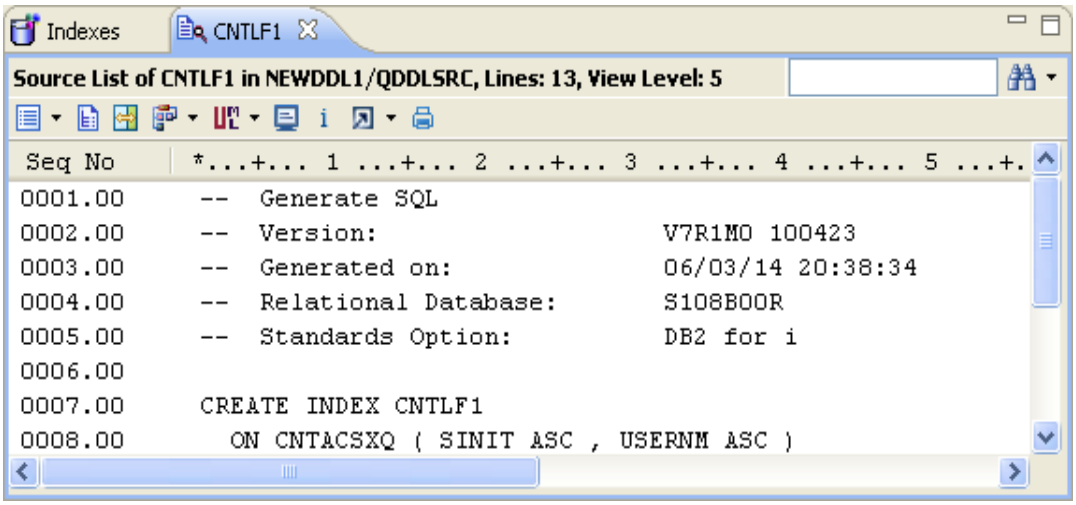
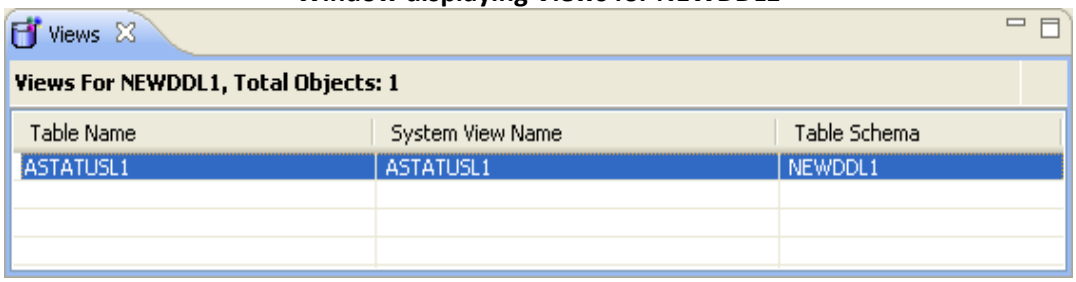
Source List window – CNTLF1


Indexes
CNTLF1
Source List of CNTLF1 in NEWDDL1/QDDLSRC, Lines: 13, View Level: 5
Seq No
*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+.
0001.00 -- Generate SQL
0002.00 -- Version: V7R1M0 100423
0003.00 -- Generated on: 06/03/14 20:38:34
0004.00 -- Relational Database: S108B00R
0005.00 -- Standards Option: DB2 for i
0006.00
0007.00 CREATE INDEX CNTLF1
0008.00 ON CNTACSXQ (SINIT ASC , USERNM ASC)

Views

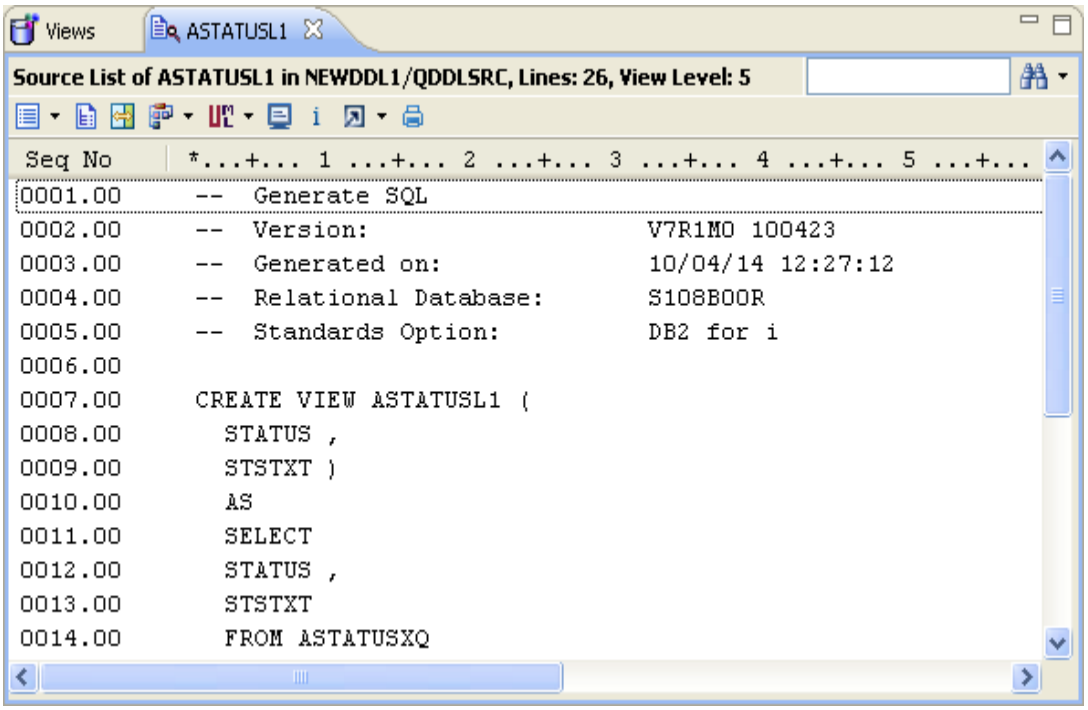
Select the **Views** sub-node to invoke the window listing the Table Name besides the System View Name. The screenshot below presents the Views window:

Window displaying Views for NEWDDL1



Select the **Zoom Source** option to invoke the Source List window.

Source List window – ASTATUSL1

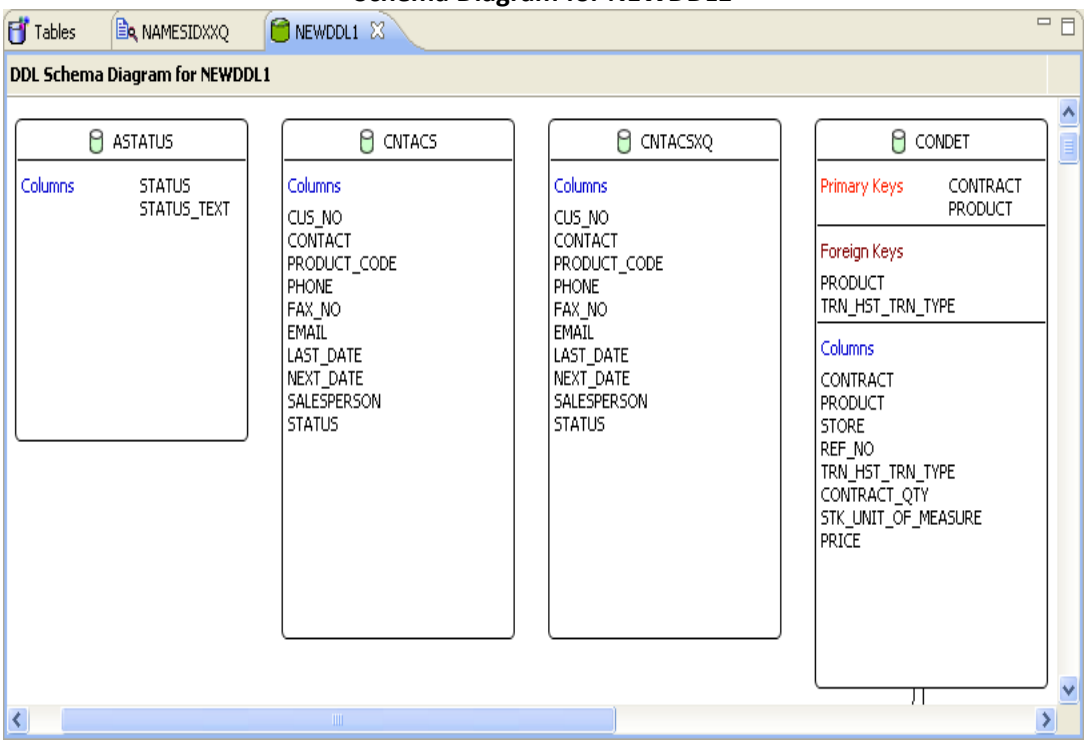

Views
ASTATUSL1
Source List of ASTATUSL1 in NEWDDL1/QDDLSRC, Lines: 26, View Level: 5
Seq No
*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+...
0001.00 -- Generate SQL
0002.00 -- Version: V7R1M0 100423
0003.00 -- Generated on: 10/04/14 12:27:12
0004.00 -- Relational Database: S108B00R
0005.00 -- Standards Option: DB2 for i
0006.00
0007.00 CREATE VIEW ASTATUSL1 (
0008.00 STATUS ,
0009.00 STSTXT)
0010.00 AS
0011.00 SELECT
0012.00 STATUS ,
0013.00 STSTXT
0014.00 FROM ASTATUSXQ

Zoom Source displays the source from QDDLSRC if existing in the given library. Otherwise, the image of DSPFFD would be displayed.

Schema Diagram

Select the Schema Diagram option to invoke a block diagram of the entire schema. The diagram shows the files and relation among the files. Relevant details like the primary keys, foreign keys, columns are presented in the Schema Diagram.

Schema Diagram for NEWDDL1

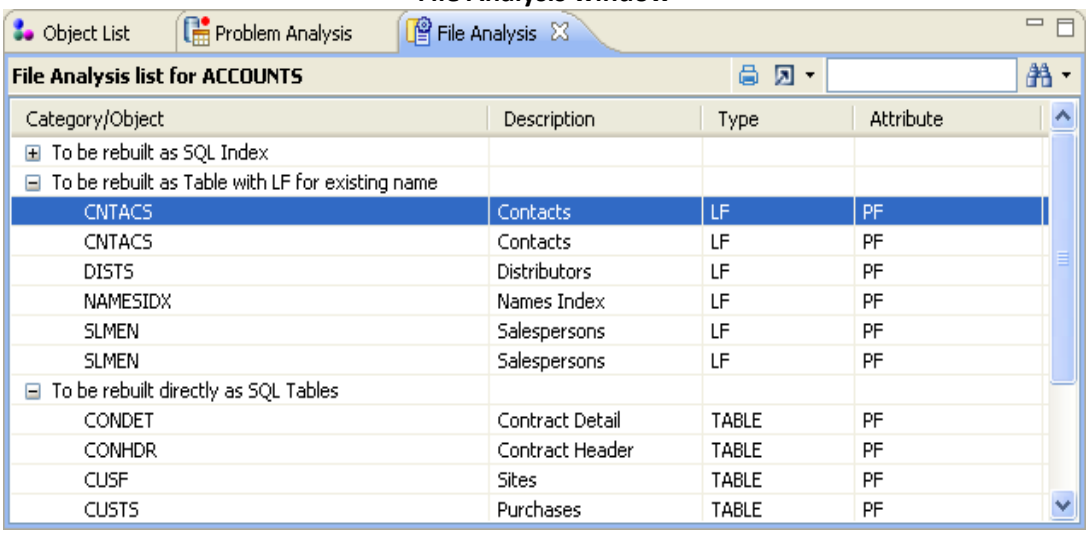


File Analysis

When you select the **File Analysis** option, a list is presented displaying all the files sorted to be rebuilt as SQL Index, SQL Table, or Table with LF for existing name.

The following screenshot shows the File Analysis list for application area, **ACCOUNTS**.

File Analysis window



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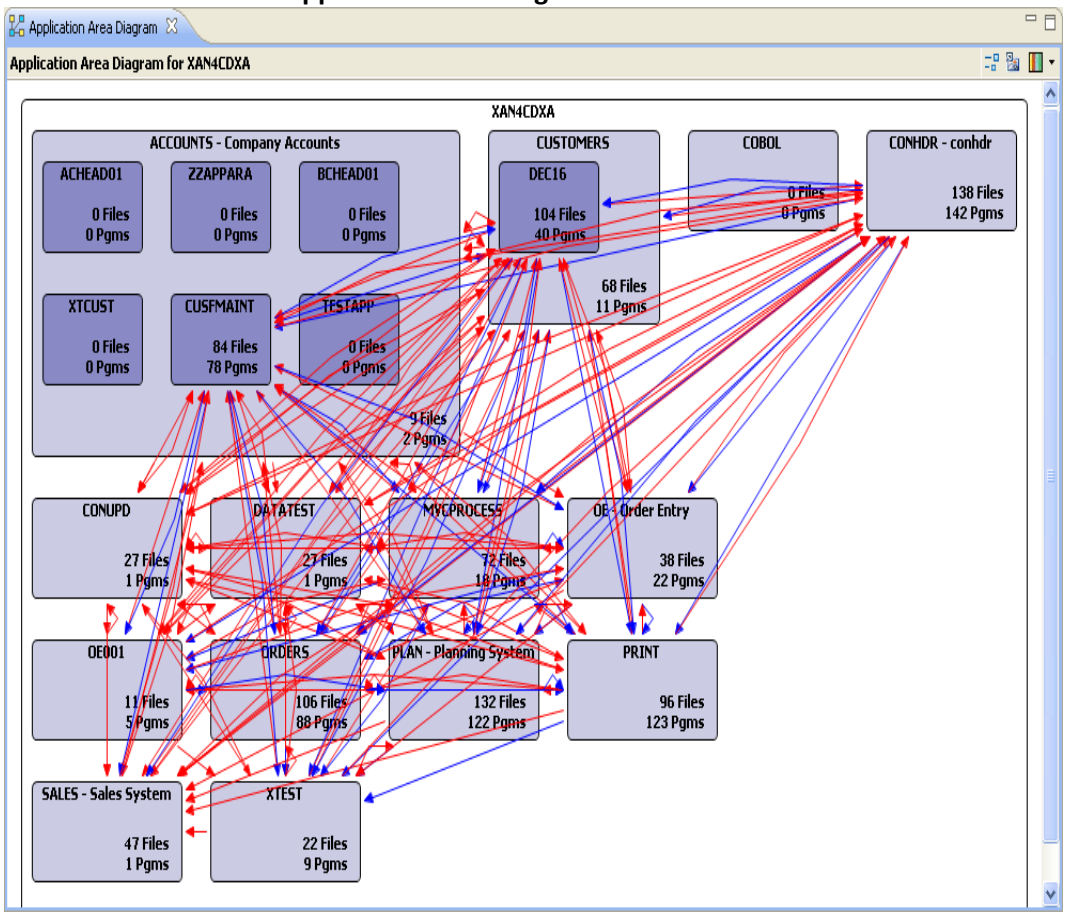
Application Area Diagramming

APPLICATION AREA DIAGRAM

X-Analysis allows easy subdivision of an application into business areas or application areas. You are able to split the application areas further into sub-application areas for better application analysis. For analyzing an application/application area, X-Analysis provides another diagrammatic construct called Application Area Diagram.

The Application Area Diagram helps in visualizing the relationships between various applications areas. When opted for the entire cross-reference library, the **Application Area Diagram** option displays all the Application Areas and sub-Application Areas.

Application Area Diagram for XAN4CDXA



The bluish-grey blocks represent an application area. The size of the box is indicative of number of objects it contains. A larger box has more objects as compared to a smaller box.

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The relationship between various application areas can also be displayed by selecting an application area. Select an application area to test this.

The Application Area Diagram also displays colored arrows – Red & Blue.

Blue Arrow – Displays Program-to-Program calls. The blue arrow points towards the application areas which has more calling programs.

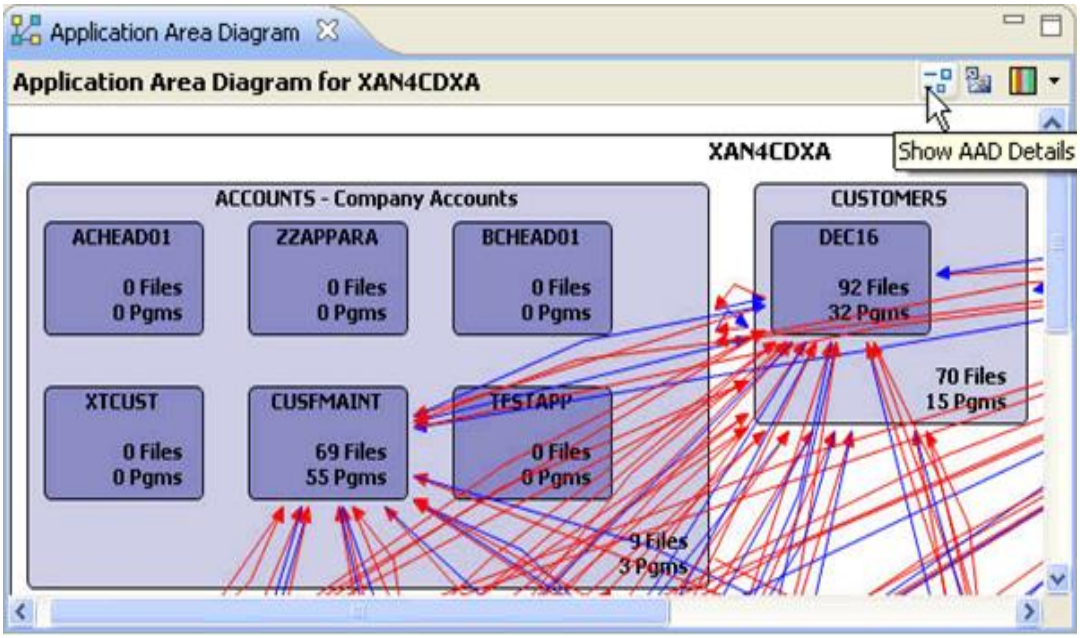
Red Arrow – Program-to-File references are displayed with distinct red arrows.

In case program from both application areas refers to files of the other application areas, then there should be two distinct red arrows.

Application Area Diagram Details View

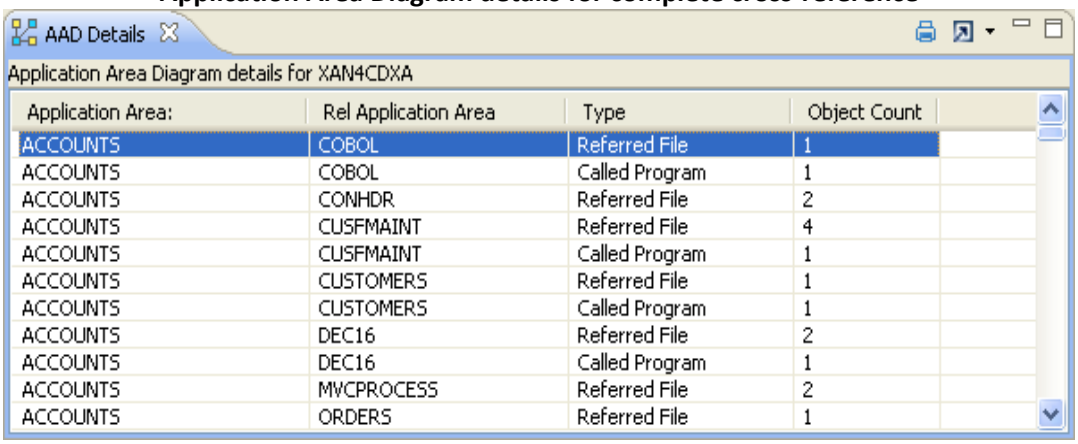
The Application Area Diagram provides an option to view the details of the Application Area Diagram. The **Show AAD Details** button is available on the toolbar of the Application Area Diagram, as shown below:

Show AAD Details button



Click the **Show AAD Details** button to invoke a new window displaying the relationship details for all the application areas.

Application Area Diagram details for complete cross-reference



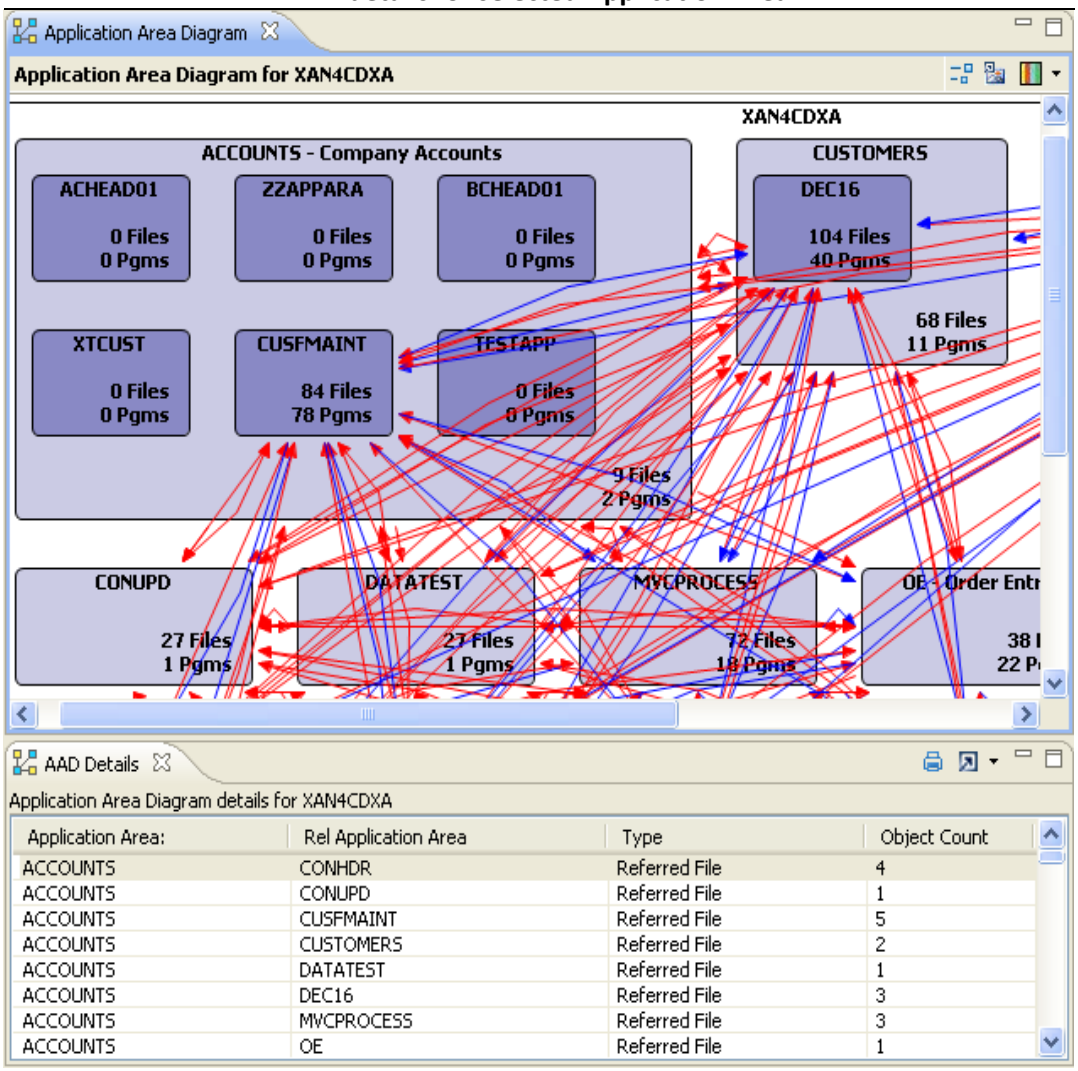
AAD Details

Application Area Diagram details for XAN4CDXA

Application Area:	Rel Application Area	Type	Object Count
ACCOUNTS	COBOL	Referred File	1
ACCOUNTS	COBOL	Called Program	1
ACCOUNTS	CONHDR	Referred File	2
ACCOUNTS	CUSFMAINT	Referred File	4
ACCOUNTS	CUSFMAINT	Called Program	1
ACCOUNTS	CUSTOMERS	Referred File	1
ACCOUNTS	CUSTOMERS	Called Program	1
ACCOUNTS	DEC16	Referred File	2
ACCOUNTS	DEC16	Called Program	1
ACCOUNTS	MVCPROCESS	Referred File	2
ACCOUNTS	ORDERS	Referred File	1

The **Show AAD Details** displays limited records, if a particular application area is selected from the Application Area Diagram.

AAD details for selected Application Area



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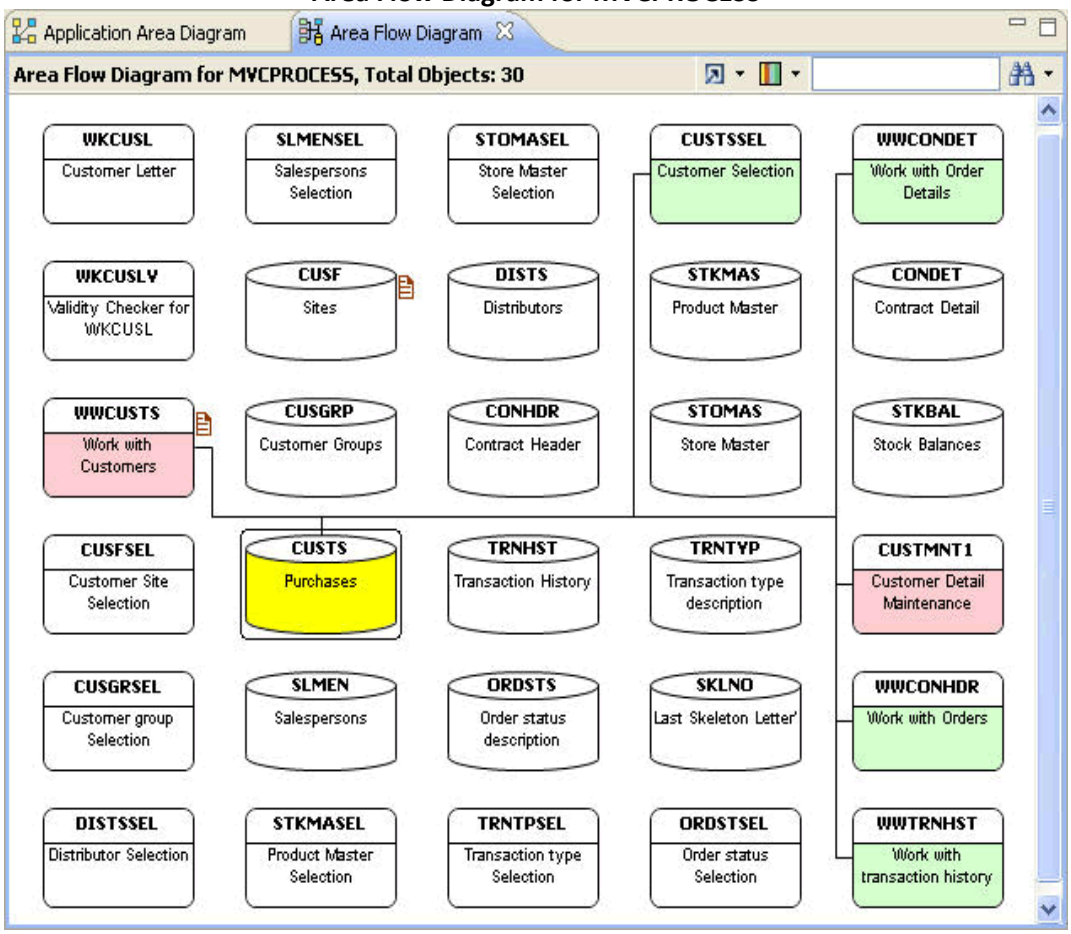
AREA FLOW DIAGRAM

The Area Flow Diagram (AFD) can be generated for an individual application area.

Select the **Area Flow Diagram** option to display programs and files in an application area along with the relations among them. The default selection is on the file having the most referring programs. The following screen displays the AFD for the application area **MVCPROCESS**.

Area Flow Diagram for MVCPROCESS



Legend

The nature of the programs and the files can be established through the AFD **Legend** bar. The image is shown below.

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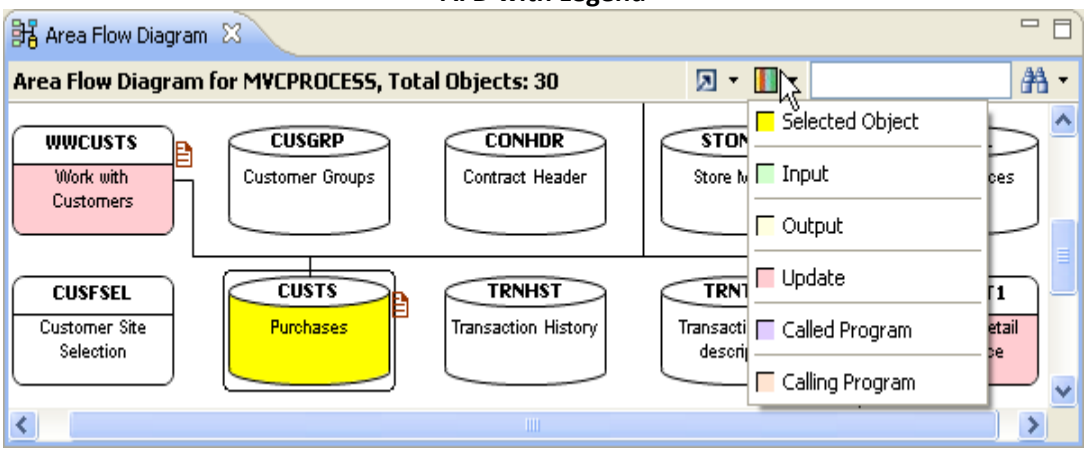
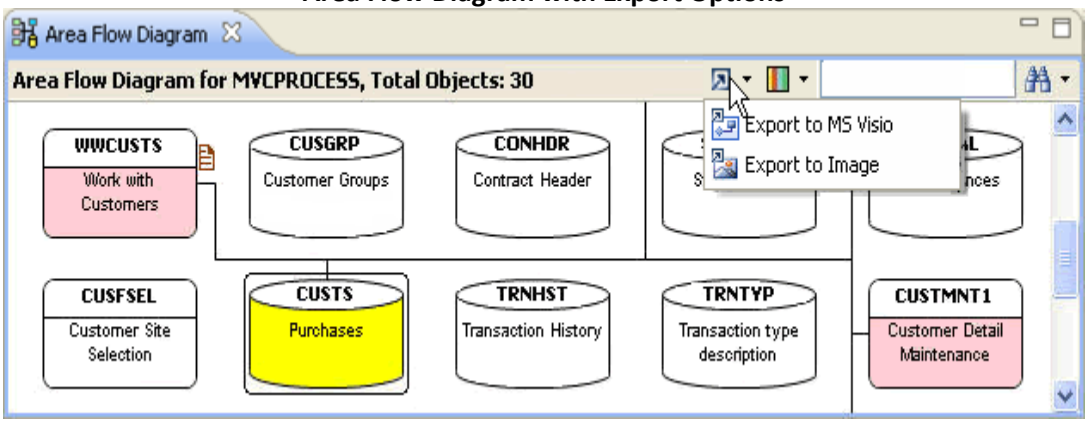
AFD with Legend



- **Selected Object** – This depicts the object on which you have made the selection. The highlighted objects are those referred to by the object.
- **Input** – This depicts the input file if program is selected, and a program receiving input if file is selected.
- **Output** – This depicts the output file if a program is selected and a program writing output if file is selected.
- **Update** – This depicts the Update file.
- **Called Program** – This depicts the program called by other programs.
- **Calling Program** – This depicts the program calling other programs.

The generated AFD can be exported to two formats by selecting the **Export to MS Visio/Image** option from **Export Options**.

Area Flow Diagram with Export Options



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Quick Reference to an Object

X-Analysis is loaded with various options that provide more information regarding the various objects/members. These options not only offer you the opportunity to refer to any given object in quick time, but also provide relevant information and/or diagrammatic presentations, as needed.

Feature	Brief Description
Jump to	Displays all the options available for a specified member, object or variable for fast access to Source Browser, DFD, Structure Chart, PSC, Object Where Used, Source cross-reference, Variable Where Used and DMD.
Source Browser View	Displays source code of the selected member. Provides various options related to the source code.
Object Where Used	Displays all the instances of an object in the application.
Variable Where Used	Displays all the instances of the specified variable in the application.
File Field Details	Displays the Field Details for a file.
LFs / Access Paths	Displays all Access Paths for the selected Physical File.
Member X-Ref	Displays all the instances of the specified variable in the source code. This is available only on the Source Browser view.
Enhanced Member X-Ref	Displays the references of a variable in the member, along with the information.
Add Bookmark	Displays the bookmarked source lines, besides allowing the user to edit bookmarks as per requirement.
More Info	Displays detailed object Information like name, library, type, attribute, etc.

JUMP TO DIALOG

The primary requirement of an analyst working with a case tool is to get quick and ample information about an object. X-Analysis facilitates this by providing faster access to the objects using the **Jump To** utility. This utility is accessible from any screen using the related button on the toolbar.

Jump to displays all the options available for a specified member, object, or variable for fast access to Source Browser, DFD, Structure Chart, PSC, Object Where Used, Member X-Reference, Variable Where Used and DMD.

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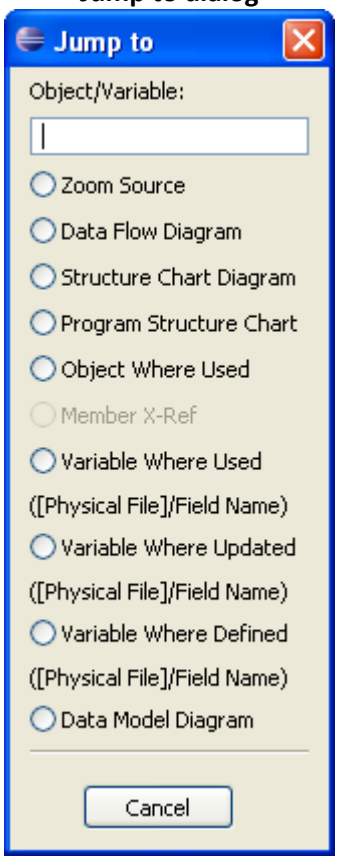
Jump to dialog



Options	Each option acts on the Object/Variable specified in the selection edit box
Zoom Source	Zooms the source code of the object.
Data Flow Diagram	Displays the Data Flow Diagram of the object.
Structure Chart Diagram	Displays the Structure Chart of the object.
Program Structure Chart	Displays the sequence of calls within the program.
Object Where Used	Displays all the instances of an object in the application.
Member X-Ref	Lists all the Source Lines where the Field/Variable has been used/referenced, in the Source Member and its associated Device Files and Copybooks. This option enables only when **Jump to** is opted on the Source Browser.
Variable Where Used	Displays all the instances of the specified variable in the application.
Variable Where Updated	Same as Variable Where Used, but displays only those source lines where the field is updated.
Variable Where Defined	Displays the source lines where the variable is defined.
Data Model Diagram	Displays the Data Model Diagram of the object.

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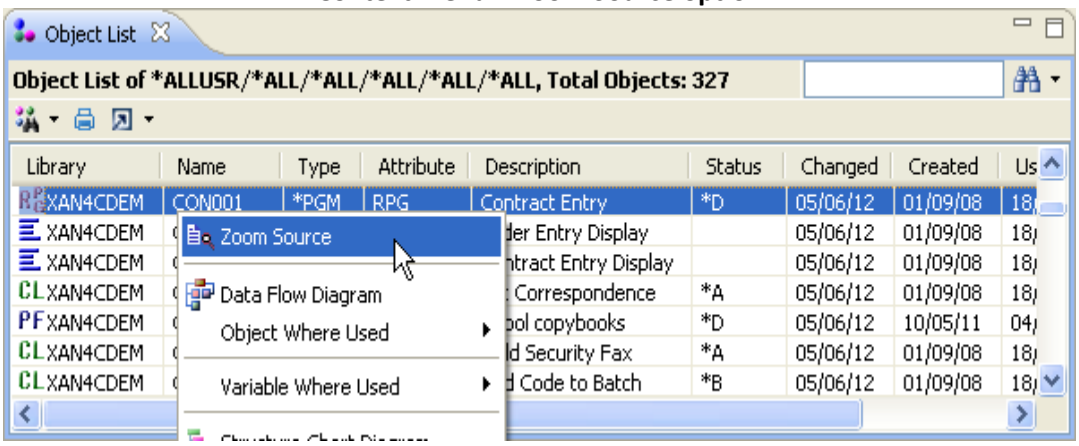
SOURCE BROWSER VIEW

The source browser displays the source for an object. The context menu on any member/object has the **Zoom Source** option which invokes the source browser for that object or member.

Context menu – Zoom Source option

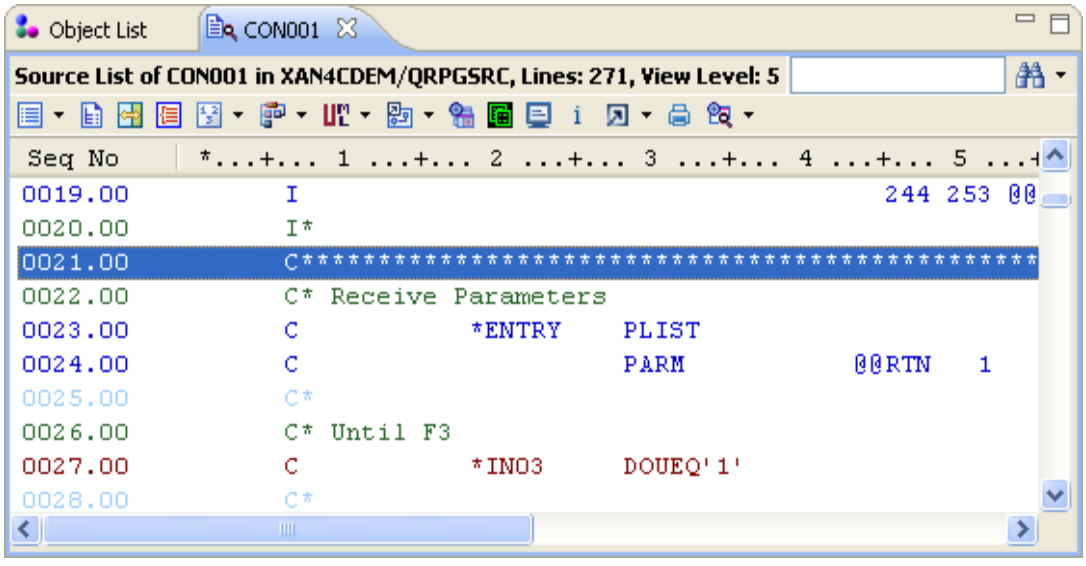


Select any member/object and double-click on it to open the source member of that object in the X-Analysis source browser.

Zoom Source

The Source Browser follows the pattern similar to IBM's SEU and is equivalent to viewing a Source Member in SEU browser mode. However, the X-Analysis source browser provides a number of additional features. It allows you to browse another source, and also continue with another zoom on reaching there. Further, you can traverse to the previous screen from where the zoom was issued.

Source Browser View



Note the following on this view:

- When the Source Browser invokes, then the cursor is positioned to the beginning of C-specifications for RPG/RPGLE programs and Procedure Division for COBOL programs.
- Double-click on the line performs 'Member cross-reference' or 'Object Where Used' depending on whether Object/Variable is available on that line. Preference is given to the **Member cross-reference** option, in case it is a Program. On Physical/Logical Files, Global Where Used is performed for the field on that line for that file.

Use of Templates by the Source Browser

The source browser uses the extension of any ***PGM** file to determine its type, for e.g. the attributes which are equivalent to CBL are: CBLLE, CBLnn (CBL36 & CBL38), CICSCBL, CICSSQLCBL, SQLCBL, SQLCBLLE, and undefined attributes if it is a COBOL Source File.

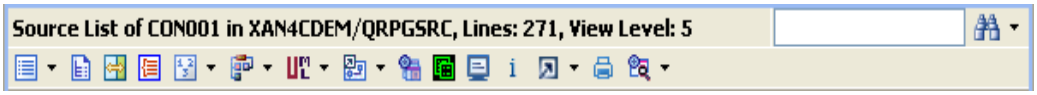
Information about an object can be displayed by selecting/highlighting the object and performing any of these:

- Opt for the context menu to select an option.
- Double-click to bring up a designated view depending on the current view.

Zoom Source toolbar

Zoom Source toolbar comprises various options which are discussed below.

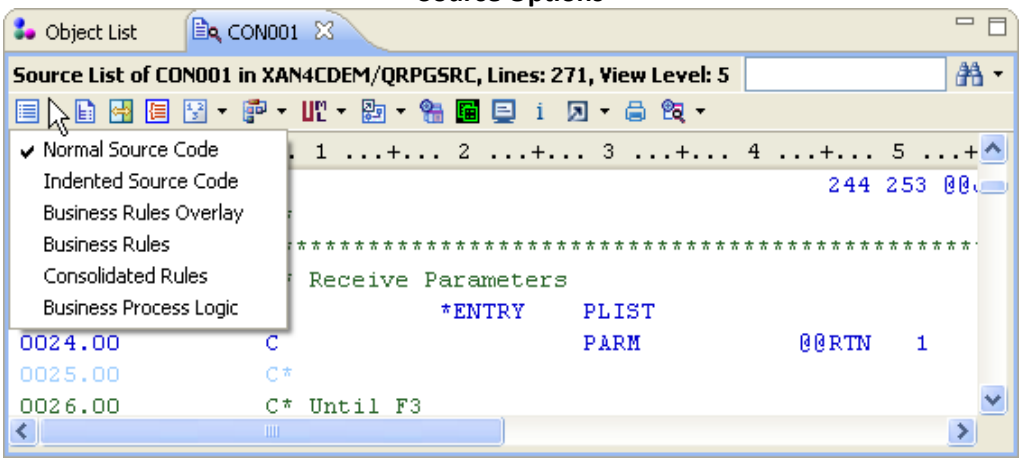
Toolbar available on Source Browser



Source Options

Source Options is the drop-down menu presenting the different source mode view that are available.

Source Options



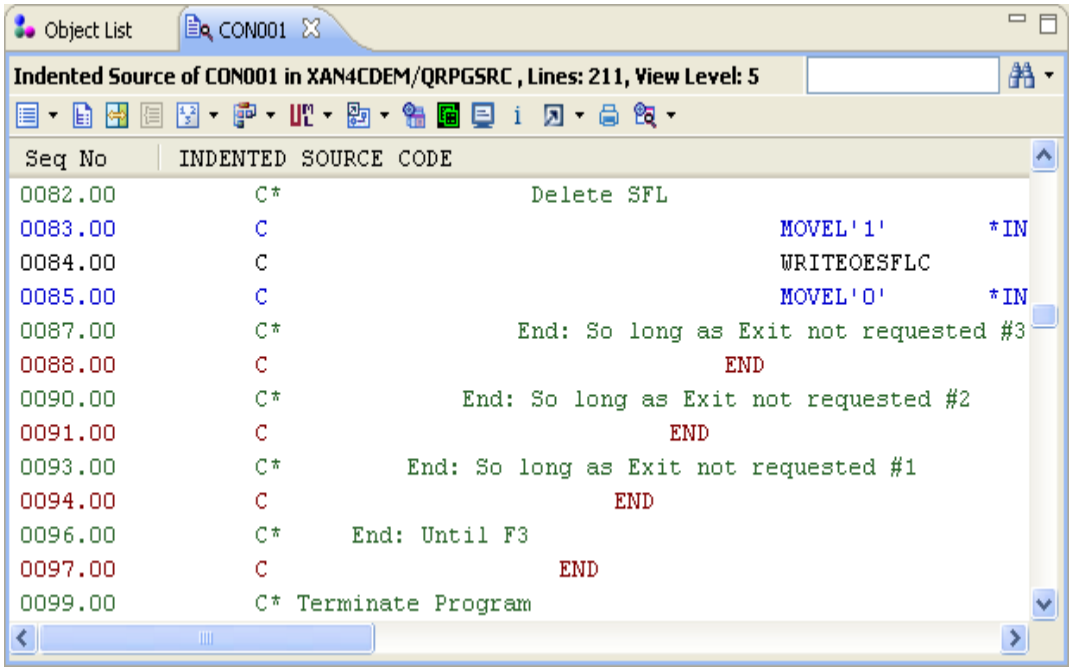
Normal Source Code

The Normal Source Code is the default source view for RPG/COBOL programs.

Indented Source Code

On selecting the **Indented Source Code** from the **Source Options** menu, the indented source code is displayed as shown below:

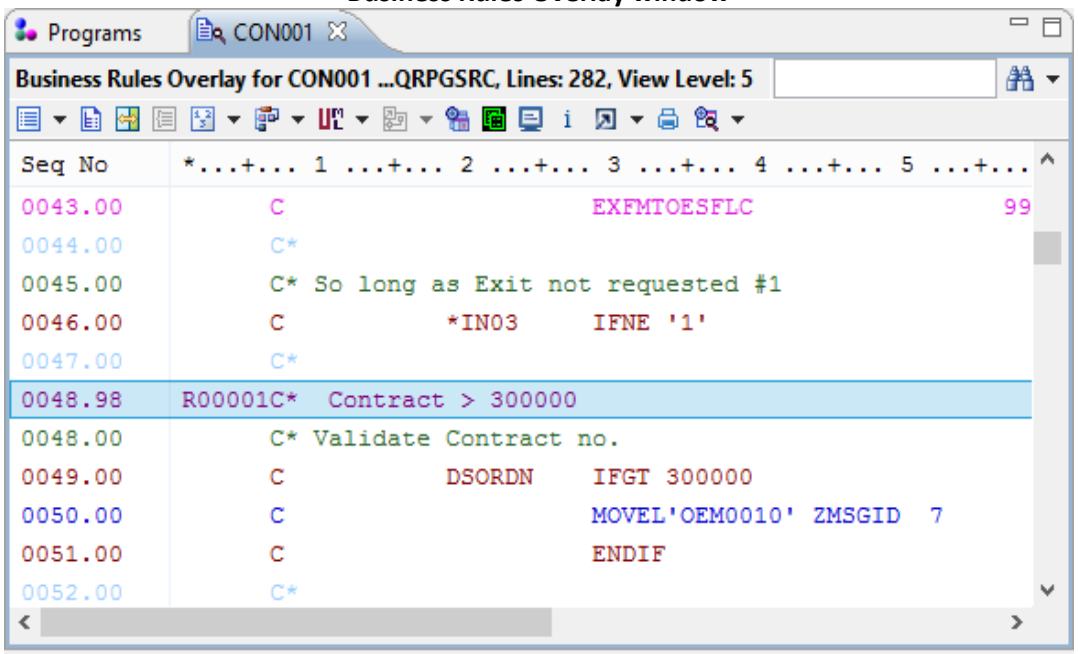
Indented Source Code

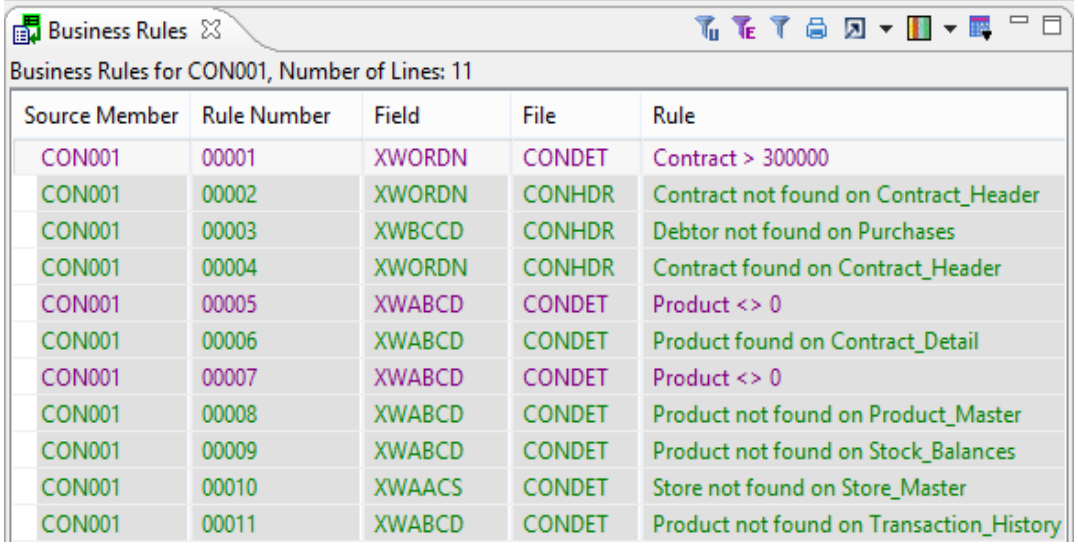

Object List
CON001
Indented Source of CON001 in XAN4CDEM/QRPGSRC , Lines: 211, View Level: 5
Seq No
INDENTED SOURCE CODE
0082.00 C* Delete SFL
0083.00 C MOVEL'1' *IN
0084.00 C WRITEOESFLC
0085.00 C MOVEL'0' *IN
0087.00 C* End: So long as Exit not requested #3
0088.00 C END
0090.00 C* End: So long as Exit not requested #2
0091.00 C END
0093.00 C* End: So long as Exit not requested #1
0094.00 C END
0096.00 C* End: Until F3
0097.00 C END
0099.00 C* Terminate Program

Business Rules Overlay

Select the **Business Rules Overlay** option to observe the business rules embedded in the Normal Source Code. The following screen displays the Business Rules Overlay view for the **CON001** program.

Business Rules Overlay window


Programs
CON001
Business Rules Overlay for CON001 ...QRPGSRC, Lines: 282, View Level: 5
Seq No
*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+...
0043.00 C EXFMTOESFLC 99
0044.00 C*
0045.00 C* So long as Exit not requested #1
0046.00 C *IN03 IFNE '1'
0047.00 C*
0048.98 R00001C* Contract > 300000
0048.00 C* Validate Contract no.
0049.00 C DSORDN IFGT 300000
0050.00 C MOVEL'OEM0010' ZMSGID 7
0051.00 C ENDIF
0052.00 C*

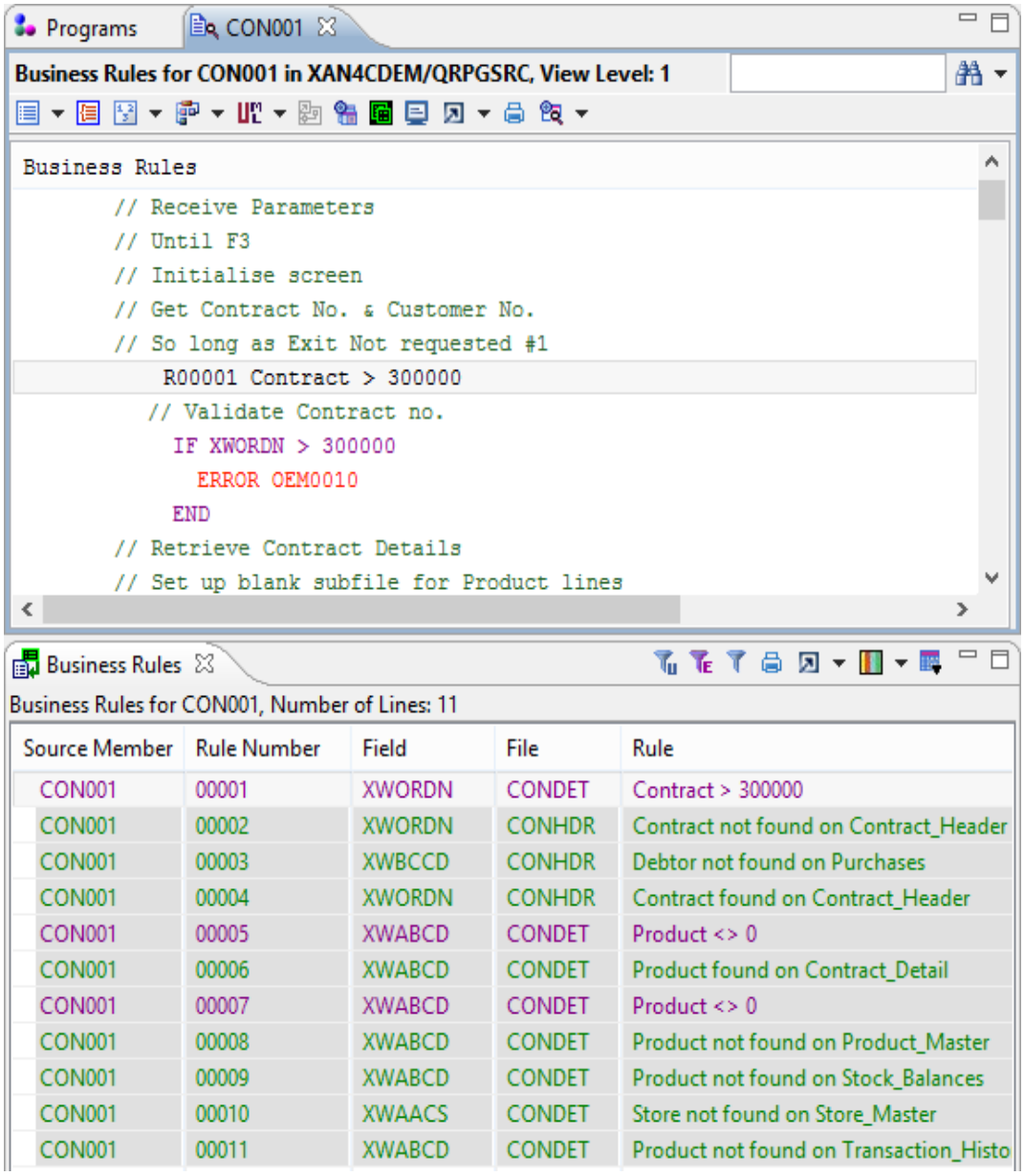


Source Member	Rule Number	Field	File	Rule
CON001	00001	XWORDN	CONDET	Contract > 300000
CON001	00002	XWORDN	CONHDR	Contract not found on Contract_Header
CON001	00003	XWBCCD	CONHDR	Debtor not found on Purchases
CON001	00004	XWORDN	CONHDR	Contract found on Contract_Header
CON001	00005	XWABCD	CONDET	Product <> 0
CON001	00006	XWABCD	CONDET	Product found on Contract_Detail
CON001	00007	XWABCD	CONDET	Product <> 0
CON001	00008	XWABCD	CONDET	Product not found on Product_Master
CON001	00009	XWABCD	CONDET	Product not found on Stock_Balances
CON001	00010	XWAACS	CONDET	Store not found on Store_Master
CON001	00011	XWABCD	CONDET	Product not found on Transaction_History

Business Rules

Select the **Business Rules** option to access the business rules for the selected source member. The Business Rules for **CON001** is displayed below.

Business Rules


Programs
CON001
Business Rules for CON001 in XAN4CDEM/QRPGSRC, View Level: 1
Business Rules
// Receive Parameters
// Until F3
// Initialise screen
// Get Contract No. & Customer No.
// So long as Exit Not requested #1
R00001 Contract > 300000
// Validate Contract no.
IF XWORDN > 300000
ERROR OEM0010
END
// Retrieve Contract Details
// Set up blank subfile for Product lines
Business Rules
Business Rules for CON001, Number of Lines: 11
Source Member | Rule Number | Field | File | Rule
CON001 | 00001 | XWORDN | CONDET | Contract > 300000
CON001 | 00002 | XWORDN | CONHDR | Contract not found on Contract_Header
CON001 | 00003 | XWBCCD | CONHDR | Debtor not found on Purchases
CON001 | 00004 | XWORDN | CONHDR | Contract found on Contract_Header
CON001 | 00005 | XWABCD | CONDET | Product <> 0
CON001 | 00006 | XWABCD | CONDET | Product found on Contract_Detail
CON001 | 00007 | XWABCD | CONDET | Product <> 0
CON001 | 00008 | XWABCD | CONDET | Product not found on Product_Master
CON001 | 00009 | XWABCD | CONDET | Product not found on Stock_Balances
CON001 | 00010 | XWAACS | CONDET | Store not found on Store_Master
CON001 | 00011 | XWABCD | CONDET | Product not found on Transaction_Histo

Consolidated Rules

Select the **Consolidated Rules** option to display the file-field based business logic for the selected source member. The consolidated rules for **CON001** are displayed below:

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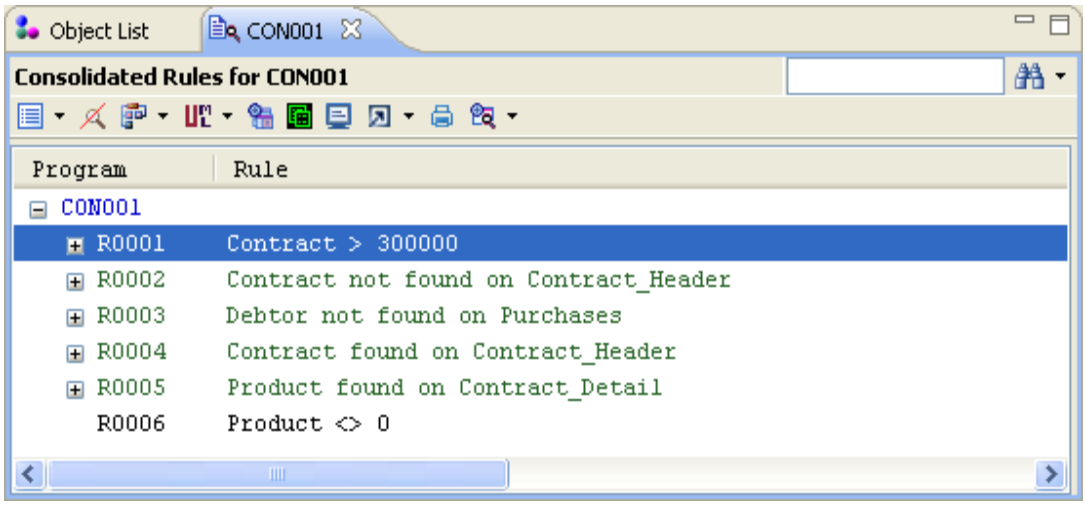
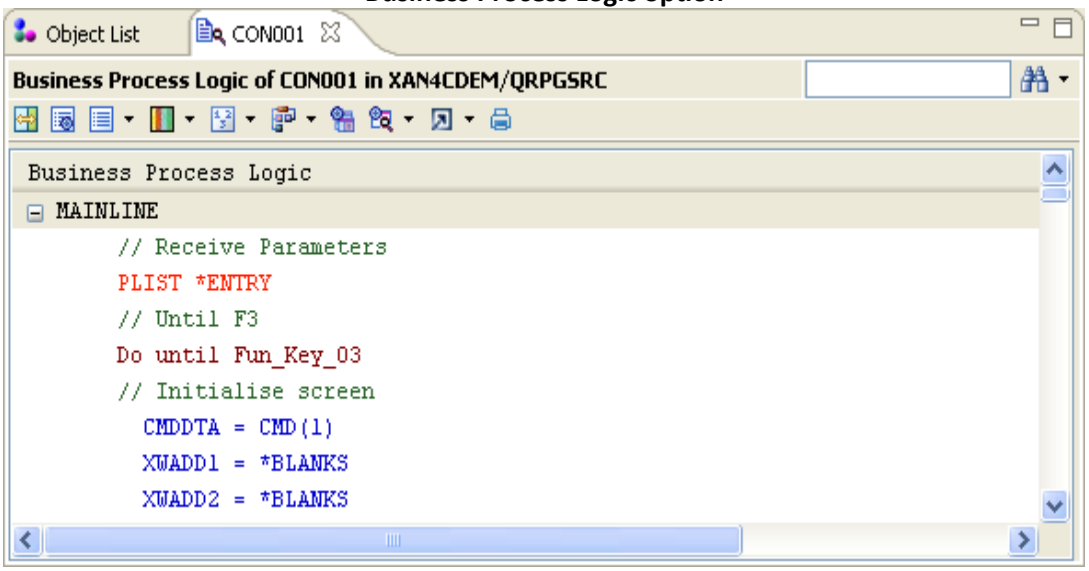
Consolidated Rules



Business Process Logic

Select the **Business Process Logic** option to access the process logic for the selected source member. The Business Process Logic for **CON001** is shown below.

Business Process Logic option



Source Outline

The **Source Outline** view lists all subroutines/modules and called programs available in the source code. The cursor is positioned to a particular line of code in the source browser when any of the listed items is double-clicked from the outline view.

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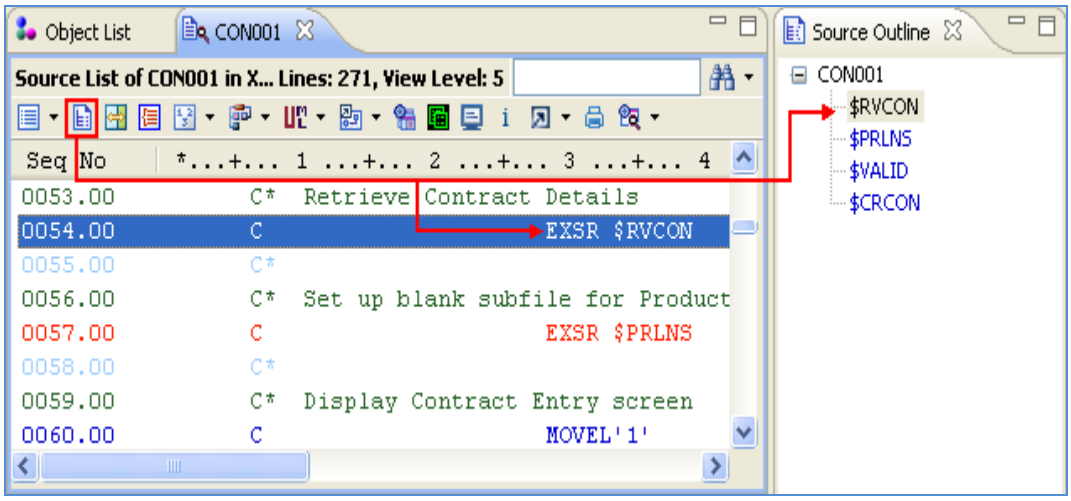
Source Outline

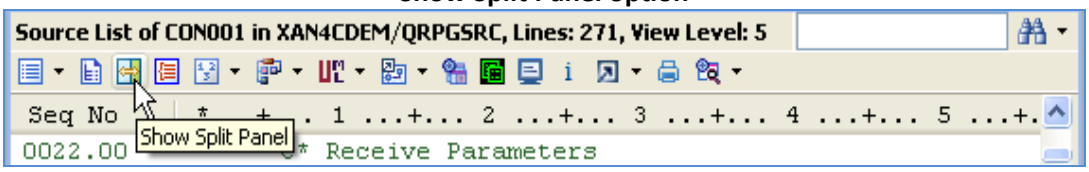


Show Split Panel

The **Show Split Panel** option helps you compare the Normal Source Code with its Business Process Logic code. It promotes better understanding of the Business Process Logic code.

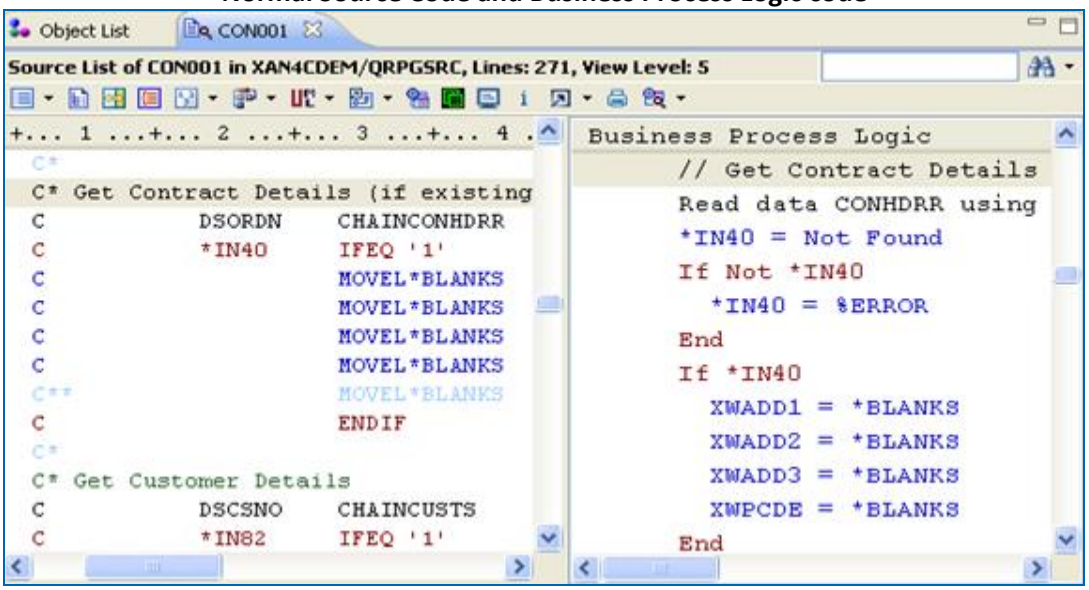
Show Split Panel is a toggle button which invokes a split panel displaying the Normal Source and the Business Process Logic code, simultaneously.

Show Split Panel option


Source List of CON001 in XAN4CDEM/QRPGSRC, Lines: 271, View Level: 5
Seq No
1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+.
Show Split Panel
0022.00 * Receive Parameters

Select the **Show Split Panel** option to display the following window:

Normal Source Code and Business Process Logic code

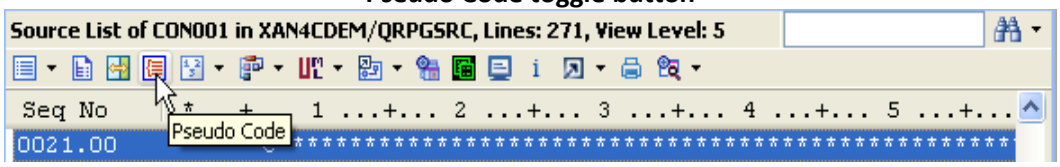


When you double-click on a particular line in the Normal/Original Source code, its corresponding source line on the Business Process Logic code gets highlighted.

Pseudo Code

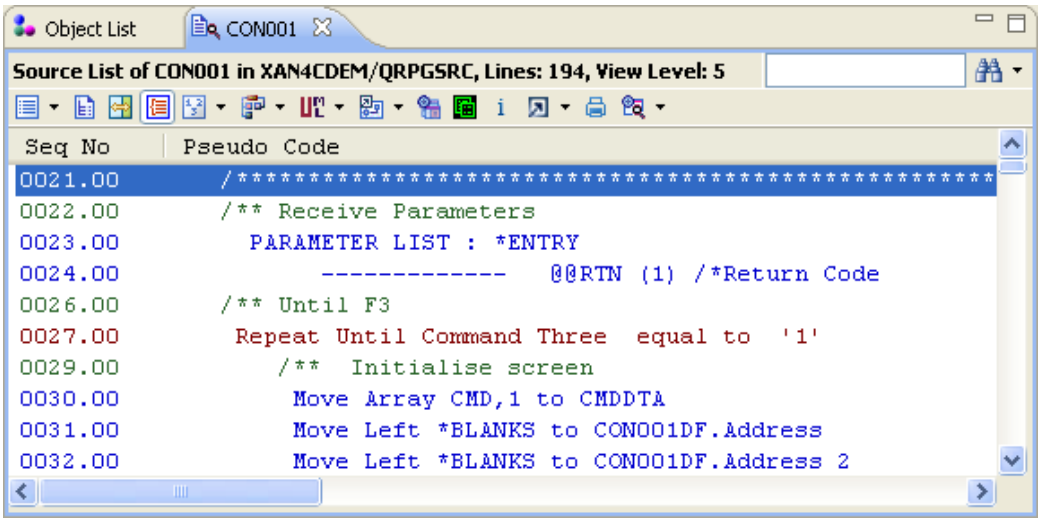
Pseudo Code is also a toggle option for viewing the Pseudo Code for the Normal Source Code.

Pseudo Code toggle button



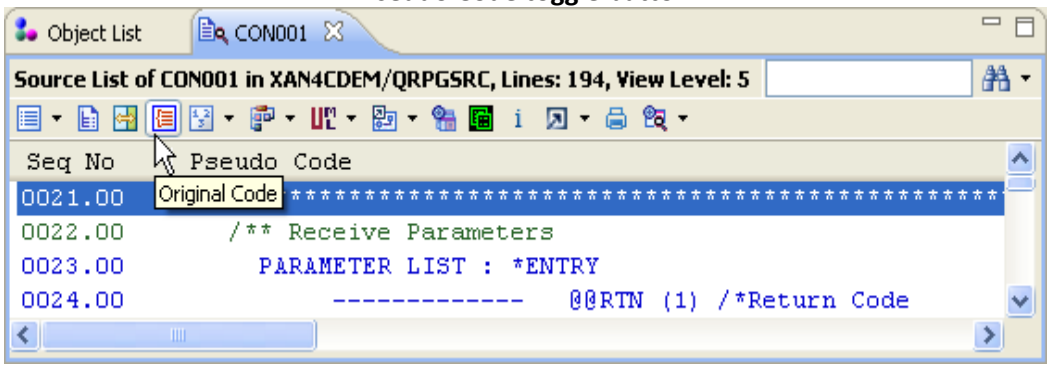
Click the icon to display the Pseudo Code for **CON001.**.

Pseudo Code for CON001


Object List
CON001
Source List of CON001 in XAN4CDEM/QRPGSRC, Lines: 194, View Level: 5
Seq No
Pseudo Code
0021.00 /**********
0022.00 /** Receive Parameters
0023.00 PARAMETER LIST : *ENTRY
0024.00 ---------- @@RTN (1) /*Return Code
0026.00 /** Until F3
0027.00 Repeat Until Command Three equal to '1'
0029.00 /** Initialise screen
0030.00 Move Array CMD,1 to CMDDTA
0031.00 Move Left *BLANKS to CON001DF.Address
0032.00 Move Left *BLANKS to CON001DF.Address 2

You can switch back to the Original Code through the toggle action of the button.

Pseudo Code toggle button



Source Level

Source Levels 1-5 are available on Program Objects only. The Source Level menu on this display allows for indentation and five levels of source listing. Each level suppresses certain source lines.

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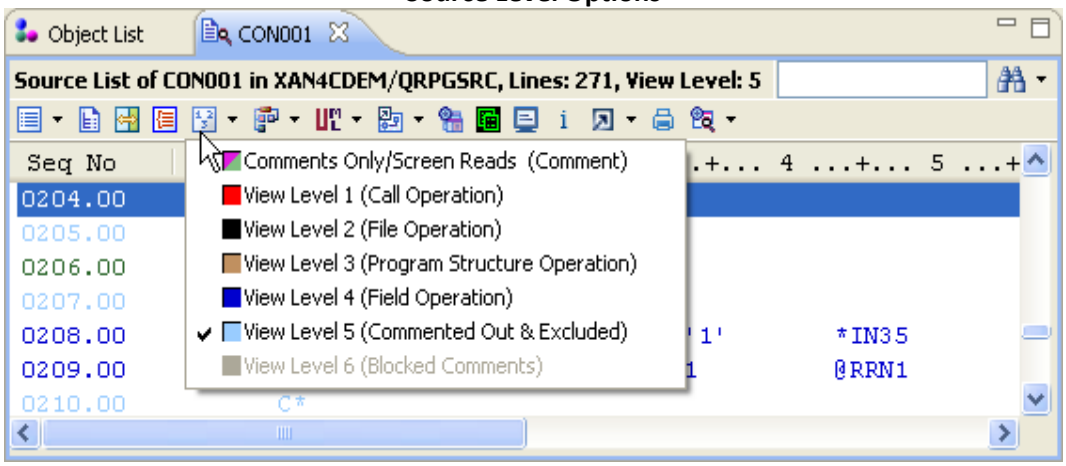
Source Level Options



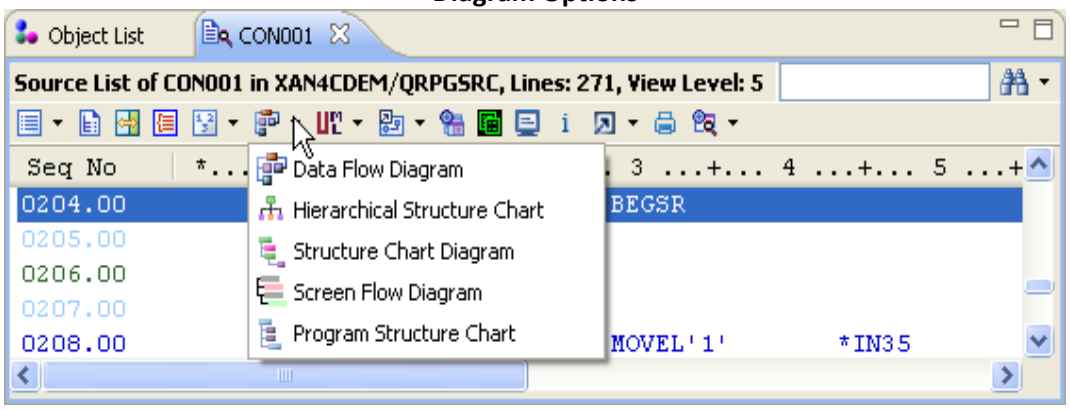
The current source level is shown on the title bar.

Diagram Options

Choose different diagram options:

1. **Data Flow Diagram**: Generates Data Flow Diagram for the Object.
2. **Hierarchical Structure Chart**: Generates Hierarchical Structure Chart diagram for the Object.
3. **Structure Chart Diagram**: Generates Structure Chart Diagram for the Object.
4. **Screen Flow Diagram**: Generates Screen Flow Diagram for the Object.
5. **Program Structure Chart**: Generates Program Structure Chart for the Object.

Diagram Options



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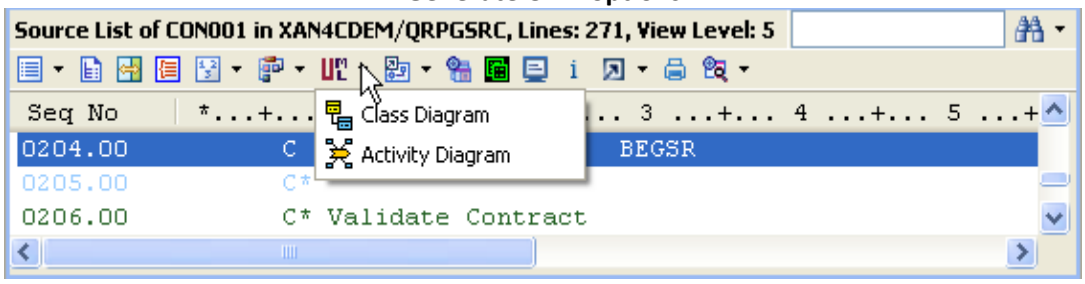
Generate UML

Choose different UML diagram options:

1. **Class Diagram**: Generates Class Diagram for the Object.
2. **Activity Diagram**: Generates Activity Diagram for the Object.

Generate UML options

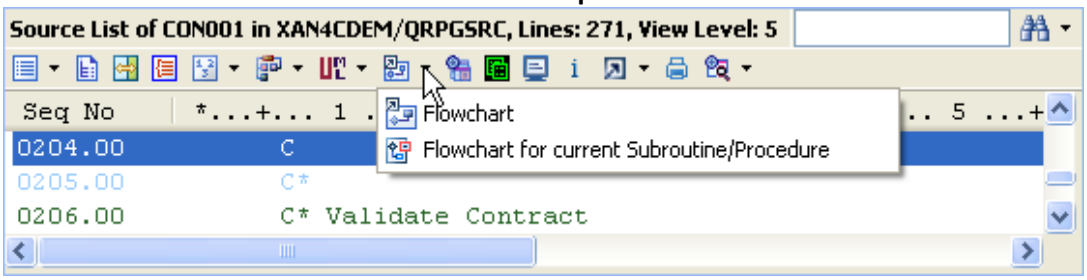


Flowchart

It is a drop-down menu, and contains two options:

1. **Flowchart**: Generates Flowchart for the Program.
2. **Flowchart for current Subroutine/Procedure**: Generates Flowchart for the selected Subroutine/Procedure of the Program.

Flowchart options

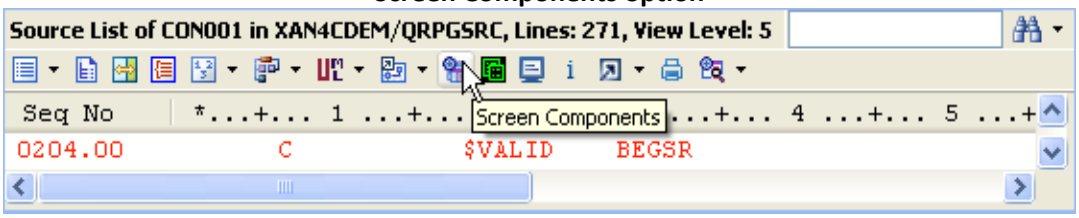


Click the **Flowchart** icon to generate a flowchart using Microsoft Visio.

Screen Components

The **Screen Components** option displays a list of all available screen components for the selected program.

Screen Components option

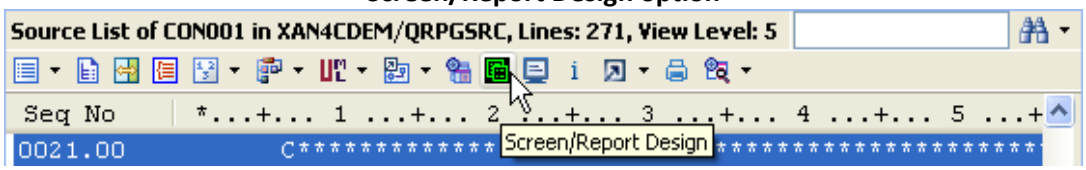


Click the **Screen Components** icon to display a list of all the screen components for the selected program.

Screen/Report Design

The **Screen/Report Design** displays layout for associated DSPF/PRTF.

Screen/Report Design option

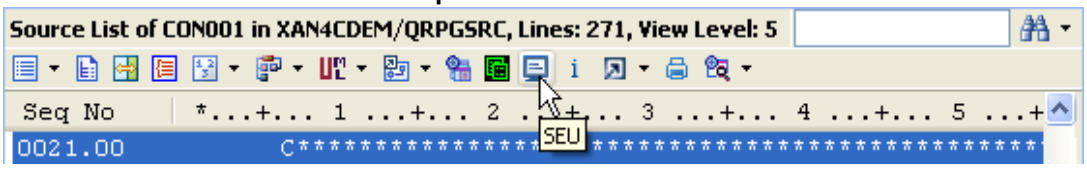


Lpex/SEU Editor

SEU

You can make changes to the source code using the **SEU** option. Click the **SEU** icon available on the Source Browser toolbar.

Invoke SEU option from the Source Browser



Lpex Editor

You can make changes to the source code using the **Zoom in Lpex** option. Click the **Zoom in Lpex** icon available on the Source Browser toolbar to initiate the Lpex editor.

Zoom in Lpex is a default option for all IBM Rational products having an RSE plugin. For all other Eclipse products, SEU (5250 Emulator) is the default option. You can change the default settings using the X-Analysis 'General Preferences' option. Invoking 5250 session requires XAN4SEU user on the IBM i. Refer to Appendix B for creating XAN4SEU user.

The X-Analysis Plugin comes with default Preferences settings. To change the Preferences settings, start IBM's RDi/RDp/WDSC (7.5 and above) or Eclipse 3.4 (and above), then select **Window > Preferences** to display the **Preferences** dialog.

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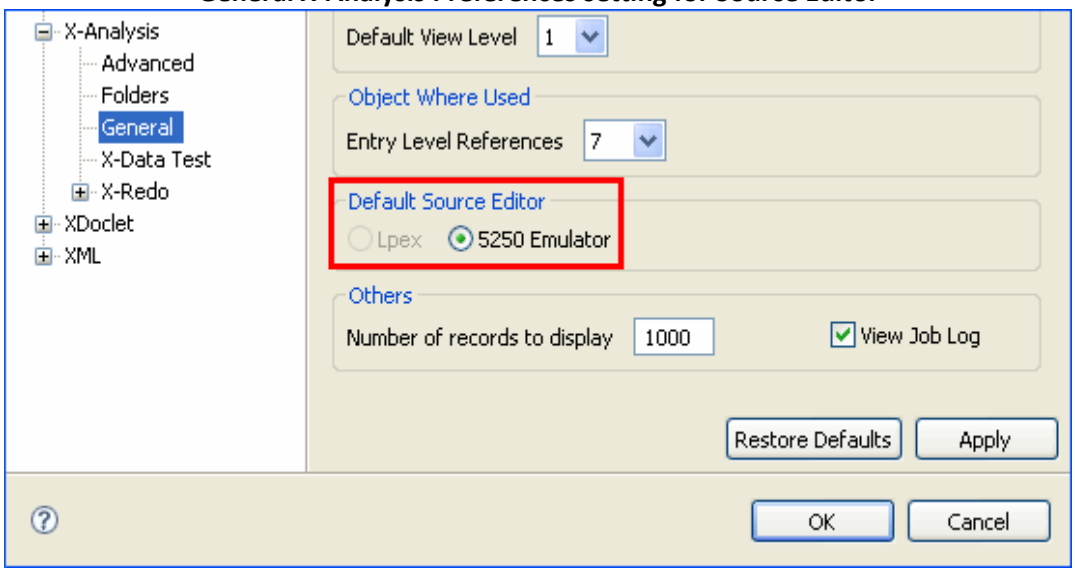
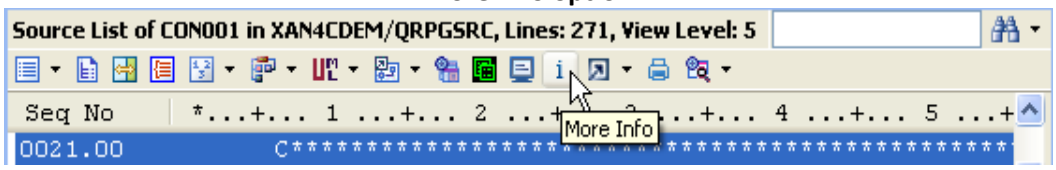
General X-Analysis Preferences setting for Source Editor



More Info

The **More Info** option presents detailed information about an object. Select the option from the source browser toolbar or the right-click menu over a selected object from the Object List.

More Info option



Important information related to the status, function, attribute etc. of an object are displayed, besides other relevant details like the number of Business Rules or the Complexity figures.

The screenshot underneath shows the **More Info** dashboard for the object, **CNTCMAINT**.

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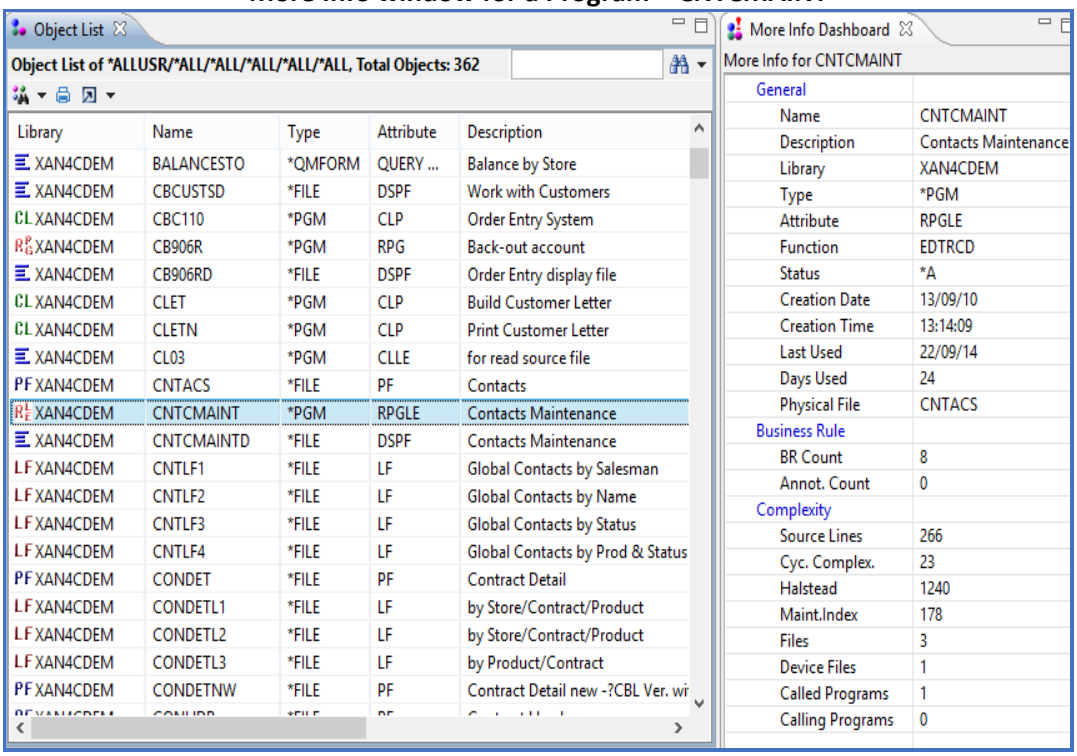
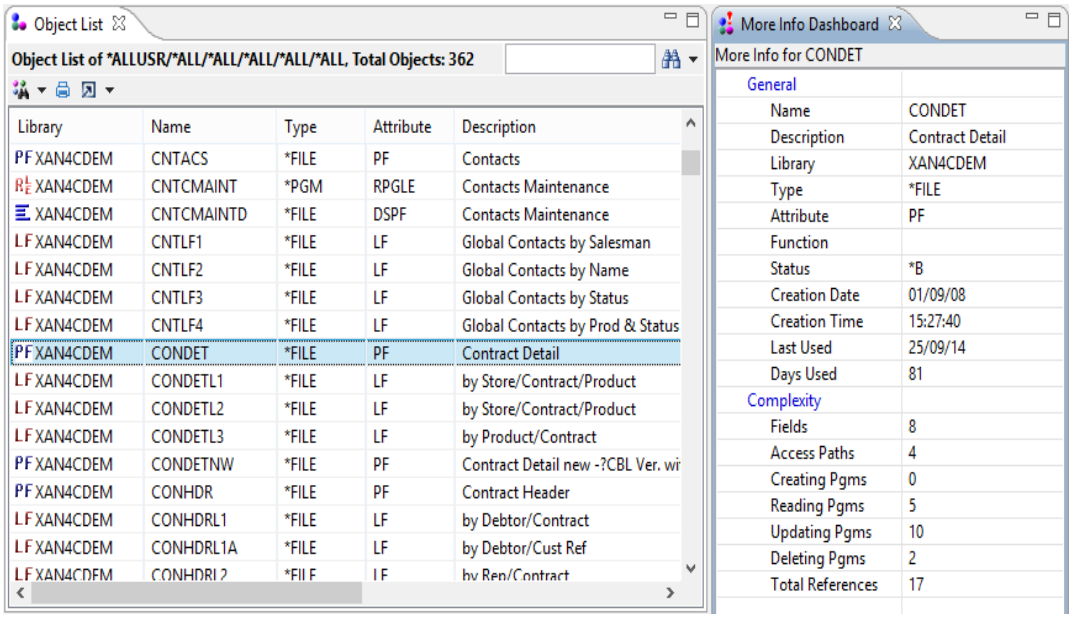
More Info window for a Program – CNTCMAINT


Object List
Object List of *ALLUSR/*ALL/*ALL/*ALL/*ALL/*ALL, Total Objects: 362
Library Name Type Attribute Description
XAN4CDEM BALANCESTO *QMFORM QUERY ... Balance by Store
XAN4CDEM CBCUSTSD *FILE DSPF Work with Customers
XAN4CDEM CBC110 *PGM CLP Order Entry System
XAN4CDEM CB906R *PGM RPG Back-out account
XAN4CDEM CB906RD *FILE DSPF Order Entry display file
XAN4CDEM CLET *PGM CLP Build Customer Letter
XAN4CDEM CLETN *PGM CLP Print Customer Letter
XAN4CDEM CL03 *PGM CLLE for read source file
XAN4CDEM CNTACS *FILE PF Contacts
XAN4CDEM CNTCMAINT *PGM RPGLE Contacts Maintenance
XAN4CDEM CNTCMAINTD *FILE DSPF Contacts Maintenance
XAN4CDEM CNTLF1 *FILE LF Global Contacts by Salesman
XAN4CDEM CNTLF2 *FILE LF Global Contacts by Name
XAN4CDEM CNTLF3 *FILE LF Global Contacts by Status
XAN4CDEM CNTLF4 *FILE LF Global Contacts by Prod & Status
XAN4CDEM CONDET *FILE PF Contract Detail
XAN4CDEM CONDETL1 *FILE LF by Store/Contract/Product
XAN4CDEM CONDETL2 *FILE LF by Store/Contract/Product
XAN4CDEM CONDETL3 *FILE LF by Product/Contract
XAN4CDEM CONDETNW *FILE PF Contract Detail new -?CBL Ver. wi
More Info Dashboard
More Info for CNTCMAINT
General
Name CNTCMAINT
Description Contacts Maintenance
Library XAN4CDEM
Type *PGM
Attribute RPGLE
Function EDTRCD
Status *A
Creation Date 13/09/10
Creation Time 13:14:09
Last Used 22/09/14
Days Used 24
Physical File CNTACS
Business Rule
BR Count 8
Annot. Count 0
Complexity
Source Lines 266
Cyc. Complex. 23
Halstead 1240
Maint.Index 178
Files 3
Device Files 1
Called Programs 1
Calling Programs 0

However, for objects with PF attribute, the **More Info** display is limited to the General and the Complexity details. The image below shows More Info (without the Business Rules count) for the PF object, **CONDET**:

More Info window for a File – CONDET

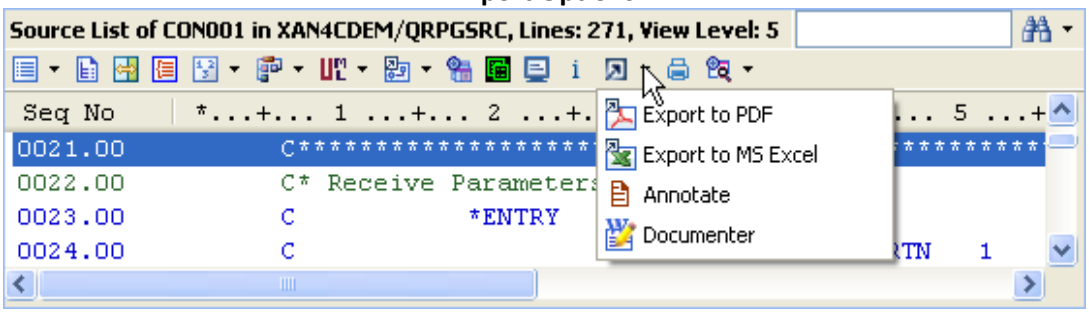

Object List
Object List of *ALLUSR/*ALL/*ALL/*ALL/*ALL/*ALL, Total Objects: 362
Library Name Type Attribute Description
XAN4CDEM CNTACS *FILE PF Contacts
XAN4CDEM CNTCMAINT *PGM RPGLE Contacts Maintenance
XAN4CDEM CNTCMAINTD *FILE DSPF Contacts Maintenance
XAN4CDEM CNTLF1 *FILE LF Global Contacts by Salesman
XAN4CDEM CNTLF2 *FILE LF Global Contacts by Name
XAN4CDEM CNTLF3 *FILE LF Global Contacts by Status
XAN4CDEM CNTLF4 *FILE LF Global Contacts by Prod & Status
XAN4CDEM CONDET *FILE PF Contract Detail
XAN4CDEM CONDETL1 *FILE LF by Store/Contract/Product
XAN4CDEM CONDETL2 *FILE LF by Store/Contract/Product
XAN4CDEM CONDETL3 *FILE LF by Product/Contract
XAN4CDEM CONDETNW *FILE PF Contract Detail new -?CBL Ver. wi
XAN4CDEM CONHDR *FILE PF Contract Header
XAN4CDEM CONHDRL1 *FILE LF by Debtor/Contract
XAN4CDEM CONHDRL1A *FILE LF by Debtor/Cust Ref
More Info Dashboard
More Info for CONDET
General
Name CONDET
Description Contract Detail
Library XAN4CDEM
Type *FILE
Attribute PF
Function
Status *B
Creation Date 01/09/08
Creation Time 15:27:40
Last Used 25/09/14
Days Used 81
Complexity
Fields 8
Access Paths 4
Creating Pgms 0
Reading Pgms 5
Updating Pgms 10
Deleting Pgms 2
Total References 17

Export Options

It is a drop-down menu, and contains options for exporting list, adding annotates and generating system document.

1. **Export to PDF/MS Word**: Exports current list on the X-Analysis Client to PDF/MS Word.
2. **Export to MS Excel**: Exports current list on the X-Analysis Client to MS Excel.
3. **Annotate**: Allows to add annotates for the selected object.
4. **Documenter**: Allows to access the **Documenter** option for generating a customized system document.

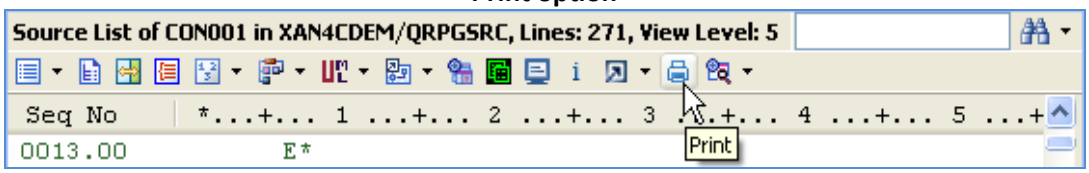
Export Options



Print option

The Print option directly prints the currently displayed source content.

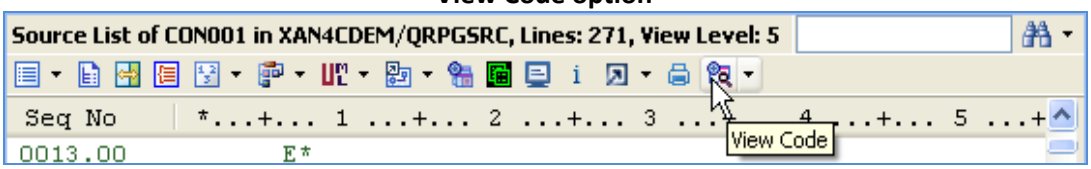
Print option



View Code option

Select the **View Code** option to view the reengineered, the restructured, or the generated code of a selected object.

View Code option



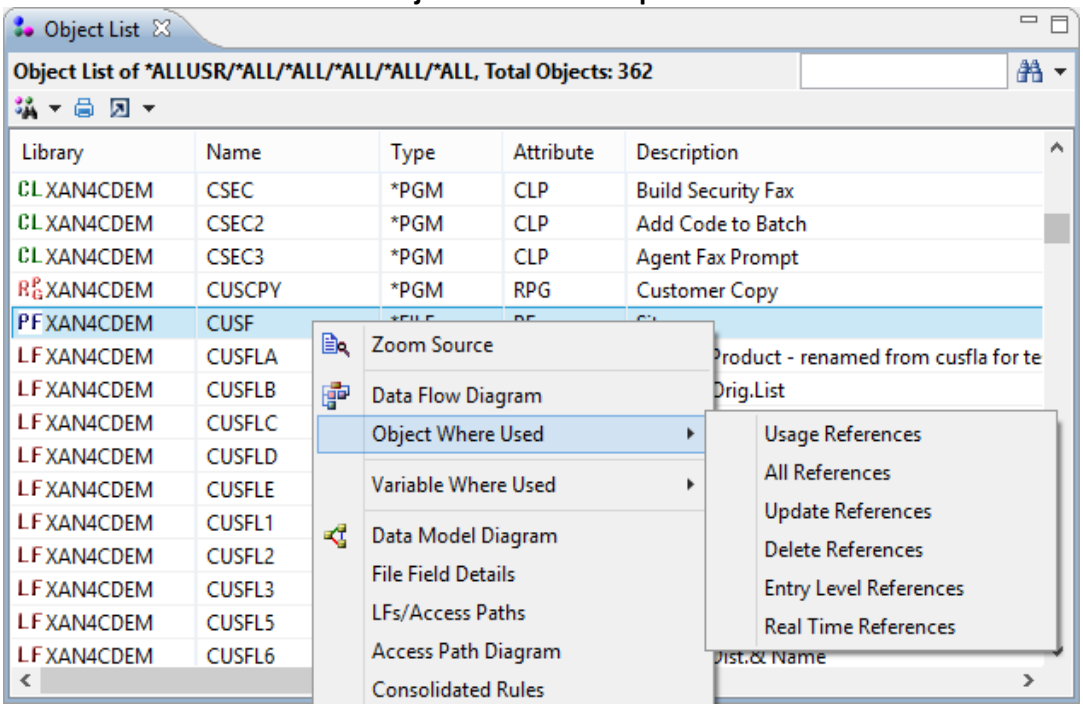
OBJECT WHERE USED

The **Object Where Used** option lists all the instances in the application where a specified object has been used/referenced. The following are the details of the sub-options of the **Object Where Used** option.

- **Usage References:** List of objects which are using this object.
- **All References:** List of objects where this object is being used. Besides this, source references for which the objects do not exist are also displayed.
- **Update References:** List of objects which are updating this object.
- **Delete References:** List of objects which are performing delete operation on the specified object.
- **Entry Level References:** Entry level references in 'Object Where Used' list all entry level programs (*A), which directly or indirectly access the object in question.
- **Real Time References:** Object Where Used references to track dependencies. It facilitates the live impact analysis at runtime, and lets you see the “Real Time” references or the object dependencies.

Select **CUSF** from the Member/Object List, and opt for the **Object Where Used** option from the context menu.

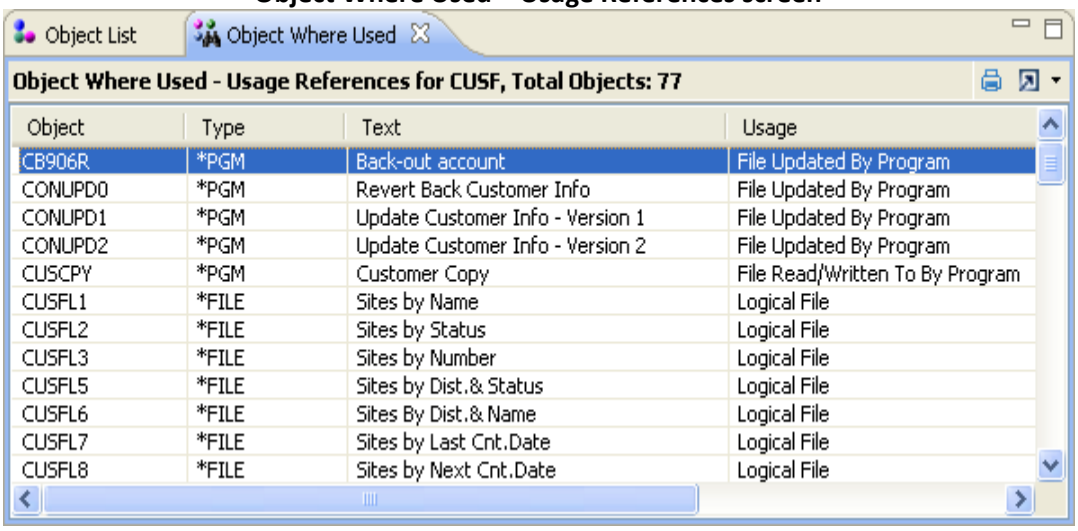
Object Where Used option



This produces an Object Where Used listing for all objects referring to **CUSF**.

If you select the Object Where Used on a PF (CUSF, in this case), then besides listing the objects using **CUSF**, the objects using the LFs built on CUSF (e.g. CUSFL3) are also reported.

Object Where Used – Usage References screen


Object List
Object Where Used
Object Where Used - Usage References for CUSF, Total Objects: 77
Object
Type
Text
Usage
CB906R *PGM Back-out account File Updated By Program
CONUPD0 *PGM Revert Back Customer Info File Updated By Program
CONUPD1 *PGM Update Customer Info - Version 1 File Updated By Program
CONUPD2 *PGM Update Customer Info - Version 2 File Updated By Program
CUSCPY *PGM Customer Copy File Read/Written To By Program
CUSFL1 *FILE Sites by Name Logical File
CUSFL2 *FILE Sites by Status Logical File
CUSFL3 *FILE Sites by Number Logical File
CUSFL5 *FILE Sites by Dist.& Status Logical File
CUSFL6 *FILE Sites By Dist.& Name Logical File
CUSFL7 *FILE Sites by Last Cnt.Date Logical File
CUSFL8 *FILE Sites by Next Cnt.Date Logical File

If you select the Object Where Used on a variable in a ***PGM** type object, then all objects where the variable has been used are listed.

Select an object and click **ENTER** to access its Source List. Alternatively, double-click on that object row. Double-click on an object from the Object Where Used list to zoom on to the source line where the first reference has been made.

VARIABLE WHERE USED

The **Variable Where Used** option lists all source lines from the application, where the field/variable of a file/program is used/referenced in any of the source members and its associated device files and copybooks.

A wide variety of options can be specified including:

Files, Array Definitions, Data Structures, Sub-Fields Data Structures, Indicators, Key Lists, Data Fields, File Formats, Subroutines, Program Variable, Array Elements, Parameter Lists, Parameters, Key Fields, Message Ids, EXCPT Names, etc.

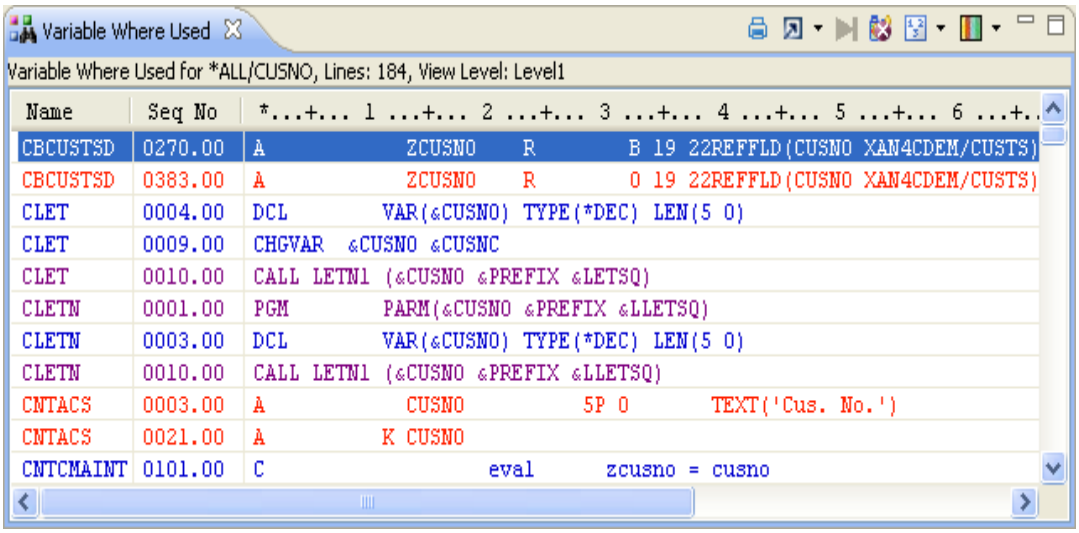
The Variable Where Used submenu provides the following options:

- **All References:** All references of this variable.
- **Update References:** References where this variable is being updated.
- **File References:** All references where the object using this variable is a file.

- **Definitions Only:** Lists references where this variable was defined.
- **Summary References:** This option on a variable or File/Field, lists all Objects that use the selected variable or File/Field and also the usages for the same. The result is displayed in Object Where Used.
- **Rule Variable References:** Lists all Business Rules based on the selected Object from across the entire application.

Select the **Variable Where Used** option for the **CUSNO** field using the **JumpTo** dialog.

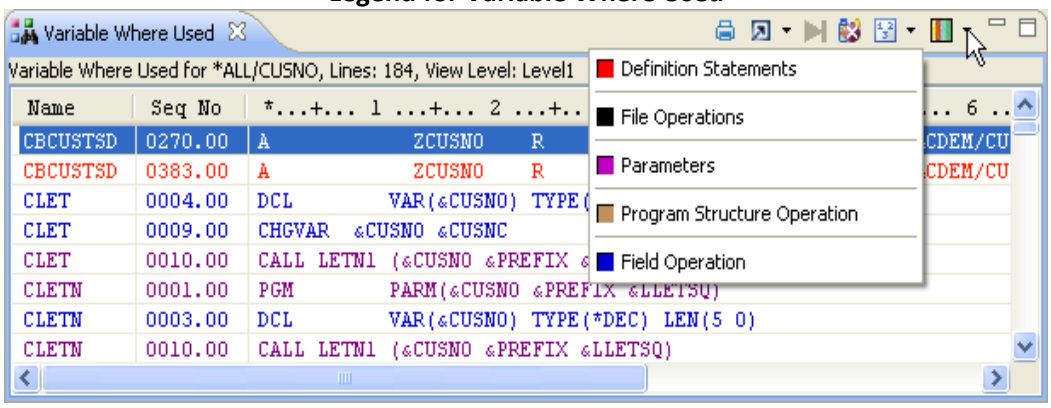
Variable Where Used view for CUSNO


Variable Where Used
Variable Where Used for *ALL/CUSNO, Lines: 184, View Level: Level1
Name Seq No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+..
CBCUSTSD 0270.00 A ZCUSNO R B 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CBCUSTSD 0383.00 A ZCUSNO R O 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CLET 0004.00 DCL VAR(&CUSNO) TYPE(*DEC) LEN(5 0)
CLET 0009.00 CHGVAR &CUSNO &CUSNC
CLET 0010.00 CALL LETN1 (&CUSNO &PREFIX &LETSQ)
CLETN 0001.00 PGM PARM(&CUSNO &PREFIX &LLETSQ)
CLETN 0003.00 DCL VAR(&CUSNO) TYPE(*DEC) LEN(5 0)
CLETN 0010.00 CALL LETN1 (&CUSNO &PREFIX &LLETSQ)
CNTACS 0003.00 A CUSNO 5P 0 TEXT('Cus. No.')
CNTACS 0021.00 A K CUSNO
CNTCMAINT 0101.00 C eval zcusno = cusno

Legend

- Dark Red depicts the Definition Statements
- Black depicts the File Operations
- Magenta depicts the Parameters
- Dark Brown depicts the Program Structure Operation
- Dark Blue depicts the Field Operation

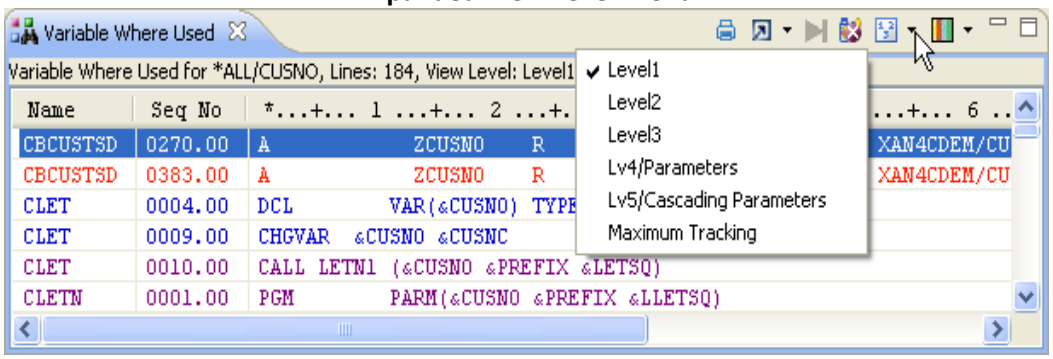
Legend for Variable Where Used


Variable Where Used
Variable Where Used for *ALL/CUSNO, Lines: 184, View Level: Level1
Definition Statements
File Operations
Parameters
Program Structure Operation
Field Operation
Name
Seq No
CBCUSTSD 0270.00 A ZCUSNO R
CBCUSTSD 0383.00 A ZCUSNO R
CLET 0004.00 DCL VAR(&CUSNO) TYPE(
CLET 0009.00 CHGVAR &CUSNO &CUSNC
CLET 0010.00 CALL LETN1 (&CUSNO &PREFIX &
CLETN 0001.00 PGM PARM(&CUSNO &PREFIX &LLETSQ)
CLETN 0003.00 DCL VAR(&CUSNO) TYPE(*DEC) LEN(5 0)
CLETN 0010.00 CALL LETN1 (&CUSNO &PREFIX &LLETSQ)

View Levels

The Variable Where Used view allows up to six view levels. The **Default View Level** icon is located on the X-Analysis toolbar, and the menu allows access to six levels of **Variable Where Used** information.

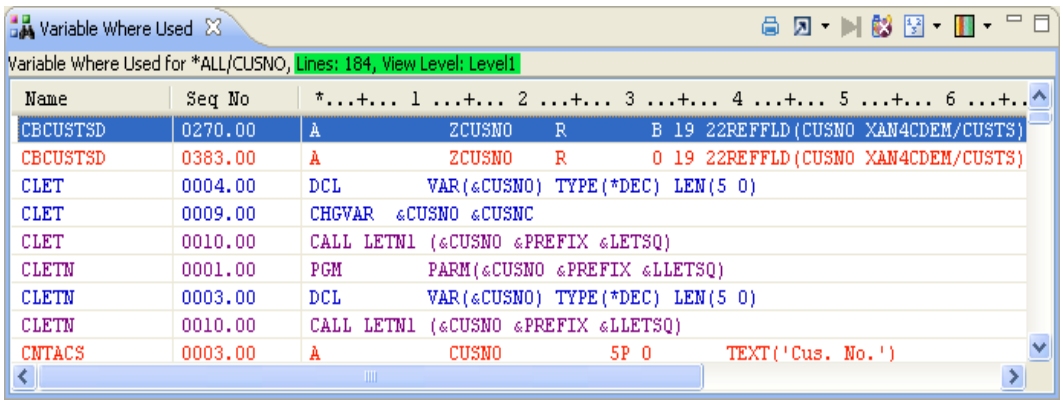
Expanded View Level Menu



Higher Variable Where Used levels can be requested using VWU Levels. The Variable Where Used levels display the following information:

- **Level 1:** Direct references to the field.

Variable Where Used Level 1 View


Variable Where Used
Variable Where Used for *ALL/CUSNO, Lines: 184, View Level: Level1
Name
Seq No
CBCUSTSD 0270.00 A ZCUSNO R B 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CBCUSTSD 0383.00 A ZCUSNO R 0 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CLET 0004.00 DCL VAR(&CUSNO) TYPE(*DEC) LEN(5 0)
CLET 0009.00 CHGVAR &CUSNO &CUSNC
CLET 0010.00 CALL LETN1 (&CUSNO &PREFIX &LETSQ)
CLETN 0001.00 PGM PARM(&CUSNO &PREFIX &LLETSQ)
CLETN 0003.00 DCL VAR(&CUSNO) TYPE(*DEC) LEN(5 0)
CLETN 0010.00 CALL LETN1 (&CUSNO &PREFIX &LLETSQ)
CNTACS 0003.00 A CUSNO 5P 0 TEXT('Cus. No.')

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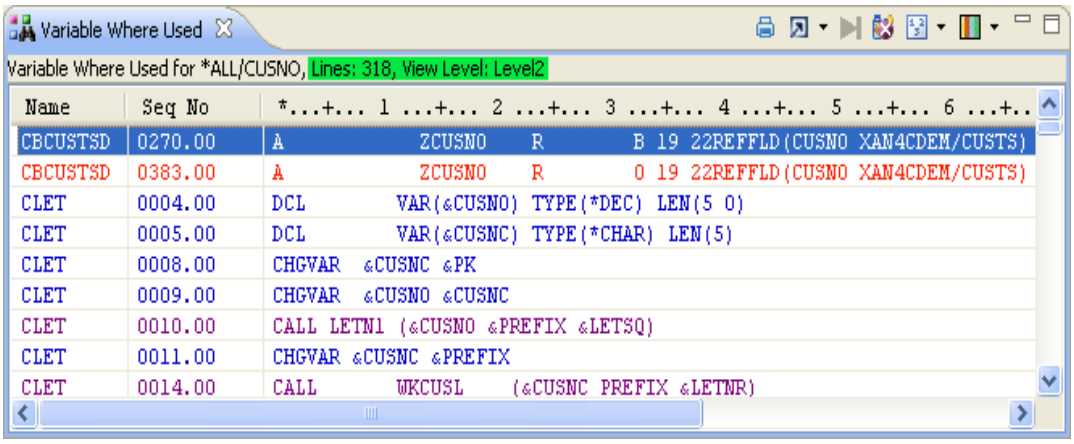
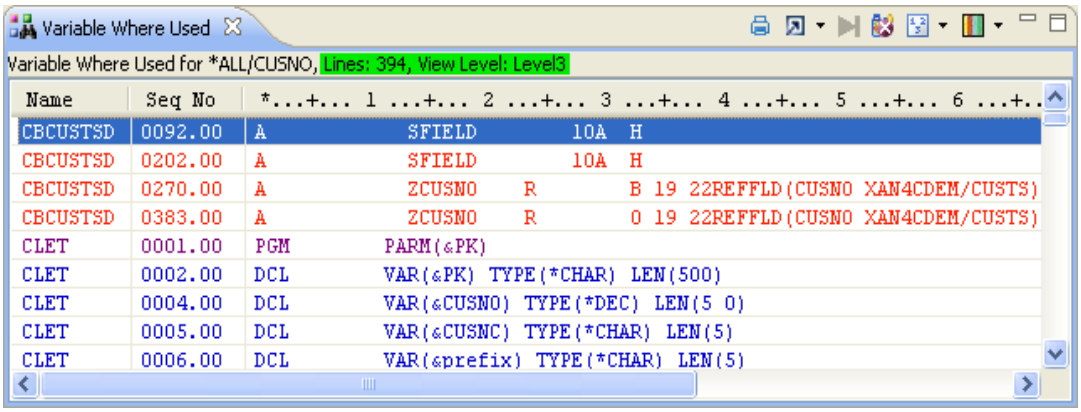
- **Level 2:** Level 2 adds indirect references.

Variable Where Used Level 2 View


Variable Where Used
Variable Where Used for *ALL/CUSNO, Lines: 318, View Level: Level2
Name Seq No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+..
CBCUSTSD 0270.00 A ZCUSNO R B 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CBCUSTSD 0383.00 A ZCUSNO R 0 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CLET 0004.00 DCL VAR(&CUSNO) TYPE(*DEC) LEN(5 0)
CLET 0005.00 DCL VAR(&CUSNC) TYPE(*CHAR) LEN(5)
CLET 0008.00 CHGVAR &CUSNC &PK
CLET 0009.00 CHGVAR &CUSNO &CUSNC
CLET 0010.00 CALL LETN1 (&CUSNO &PREFIX &LETSQ)
CLET 0011.00 CHGVAR &CUSNC &PREFIX
CLET 0014.00 CALL WKCUSL (&CUSNC PREFIX &LETNR)

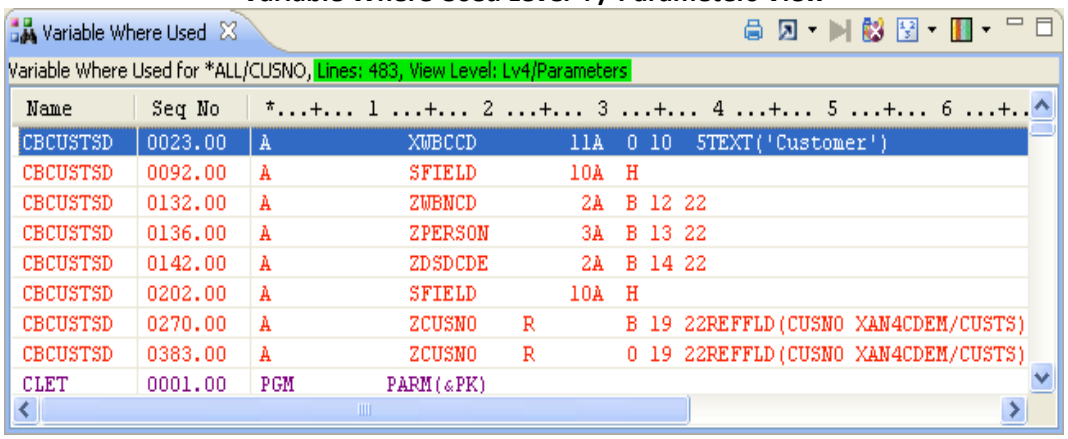
- **Level 3:** Level 3 adds further indirection/references to the field in level 2 referencing the first field.

Variable Where Used Level 3 View


Variable Where Used
Variable Where Used for *ALL/CUSNO, Lines: 394, View Level: Level3
Name Seq No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+..
CBCUSTSD 0092.00 A SFIELD 10A H
CBCUSTSD 0202.00 A SFIELD 10A H
CBCUSTSD 0270.00 A ZCUSNO R B 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CBCUSTSD 0383.00 A ZCUSNO R 0 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CLET 0001.00 PGM PARM(&PK)
CLET 0002.00 DCL VAR(&PK) TYPE(*CHAR) LEN(500)
CLET 0004.00 DCL VAR(&CUSNO) TYPE(*DEC) LEN(5 0)
CLET 0005.00 DCL VAR(&CUSNC) TYPE(*CHAR) LEN(5)
CLET 0006.00 DCL VAR(&prefix) TYPE(*CHAR) LEN(5)

- **Level 4/Parameters:** Level 4 further includes fields used as parameters.

Variable Where Used Level 4 / Parameters View


Variable Where Used
Variable Where Used for *ALL/CUSNO, Lines: 483, View Level: Lv4/Parameters
Name Seq No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+..
CBCUSTSD 0023.00 A XWBCCD 11A 0 10 5TEXT('Customer')
CBCUSTSD 0092.00 A SFIELD 10A H
CBCUSTSD 0132.00 A ZWBNCD 2A B 12 22
CBCUSTSD 0136.00 A ZPERSON 3A B 13 22
CBCUSTSD 0142.00 A ZDSDCDE 2A B 14 22
CBCUSTSD 0202.00 A SFIELD 10A H
CBCUSTSD 0270.00 A ZCUSNO R B 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CBCUSTSD 0383.00 A ZCUSNO R 0 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CLET 0001.00 PGM PARM(&PK)

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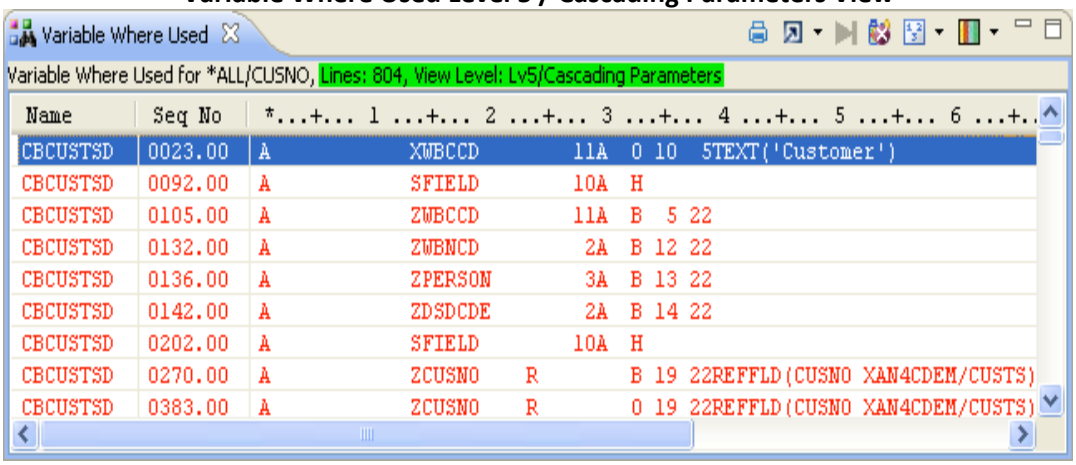
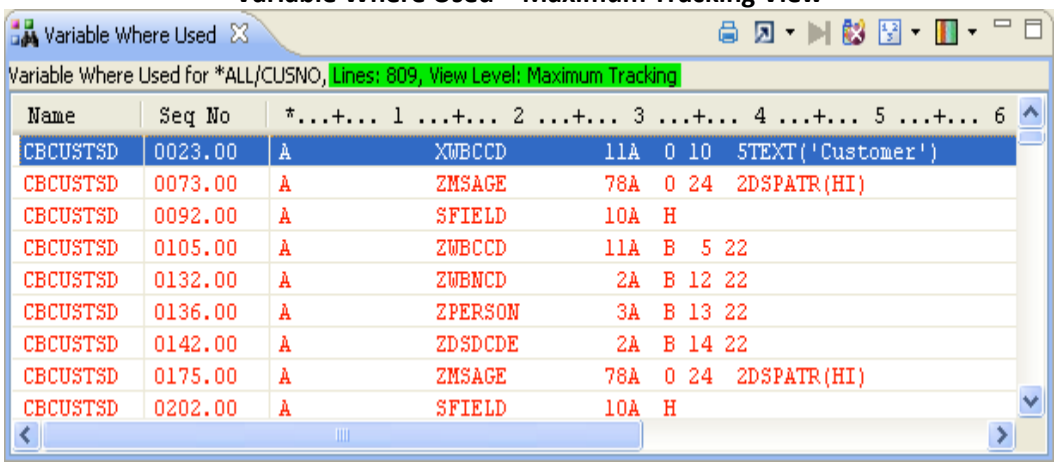
- **Level 5/Cascading Parameters:** Extending the information in Level 4, Level 5 includes references where CUSNO fields are parameters in a function, called by another function.

Variable Where Used Level 5 / Cascading Parameters View


Variable Where Used
Variable Where Used for *ALL/CUSNO, Lines: 804, View Level: Lv5/Cascading Parameters
Name Seq No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+..
CBCUSTSD 0023.00 A XWBCCD 11A 0 10 5TEXT('Customer')
CBCUSTSD 0092.00 A SFIELD 10A H
CBCUSTSD 0105.00 A ZWBCCD 11A B 5 22
CBCUSTSD 0132.00 A ZWBNCD 2A B 12 22
CBCUSTSD 0136.00 A ZPERSON 3A B 13 22
CBCUSTSD 0142.00 A ZDSDCDE 2A B 14 22
CBCUSTSD 0202.00 A SFIELD 10A H
CBCUSTSD 0270.00 A ZCUSNO R B 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)
CBCUSTSD 0383.00 A ZCUSNO R 0 19 22REFFLD(CUSNO XAN4CDEM/CUSTS)

- **Maximum Tracking:** Tracks the usage of a variable or field to maximum level of indirection.

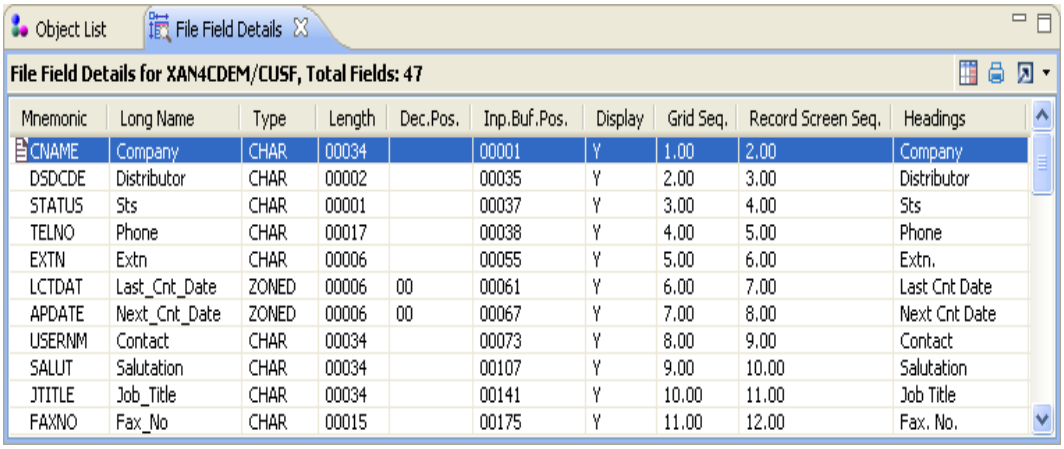
Variable Where Used – Maximum Tracking View


Variable Where Used
Variable Where Used for *ALL/CUSNO, Lines: 809, View Level: Maximum Tracking
Name Seq No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6
CBCUSTSD 0023.00 A XWBCCD 11A 0 10 5TEXT('Customer')
CBCUSTSD 0073.00 A ZMSAGE 78A 0 24 2DSPATR(HI)
CBCUSTSD 0092.00 A SFIELD 10A H
CBCUSTSD 0105.00 A ZWBCCD 11A B 5 22
CBCUSTSD 0132.00 A ZWBNCD 2A B 12 22
CBCUSTSD 0136.00 A ZPERSON 3A B 13 22
CBCUSTSD 0142.00 A ZDSDCDE 2A B 14 22
CBCUSTSD 0175.00 A ZMSAGE 78A 0 24 2DSPATR(HI)
CBCUSTSD 0202.00 A SFIELD 10A H

File Field Details

Select the **File Field Details** option to display the field details for a file. This option is available only for the PF type of objects. Opt for the context menu on any of the PF from the Member/Object List and select the **File Field Details** option. The following window will be displayed.

File Field Details for CUSF

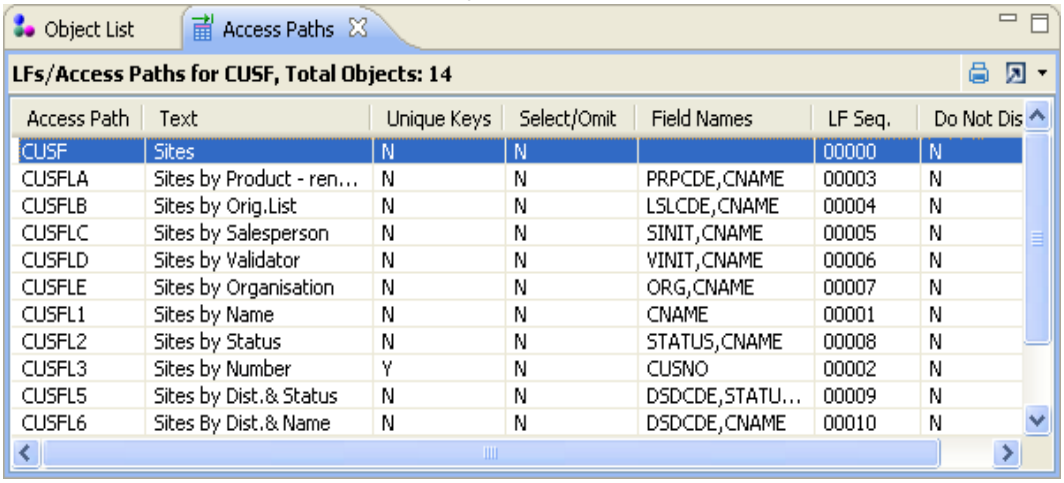


Mnemonic	Long Name	Type	Length	Dec.Pos.	Inp.Buf.Pos.	Display	Grid Seq.	Record Screen Seq.	Headings
CNAME	Company	CHAR	00034		00001	Y	1.00	2.00	Company
DSDCDE	Distributor	CHAR	00002		00035	Y	2.00	3.00	Distributor
STATUS	Sts	CHAR	00001		00037	Y	3.00	4.00	Sts
TELNO	Phone	CHAR	00017		00038	Y	4.00	5.00	Phone
EXTN	Extn	CHAR	00006		00055	Y	5.00	6.00	Extn.
LCTDAT	Last_Cnt_Date	ZONED	00006	00	00061	Y	6.00	7.00	Last Cnt Date
APDATE	Next_Cnt_Date	ZONED	00006	00	00067	Y	7.00	8.00	Next Cnt Date
USERNM	Contact	CHAR	00034		00073	Y	8.00	9.00	Contact
SALUT	Salutation	CHAR	00034		00107	Y	9.00	10.00	Salutation
JTITLE	Job_Title	CHAR	00034		00141	Y	10.00	11.00	Job Title
FAXNO	Fax_No	CHAR	00015		00175	Y	11.00	12.00	Fax. No.

LFs/Access Paths

Select the **LFs/Access Paths** option to display all Access Paths for the selected physical file. Opt for the context menu on a PF from the Object/Member List, and then select the **LFs/Access Paths** option.

LFs / Access Paths



Access Path	Text	Unique Keys	Select/Omit	Field Names	LF Seq.	Do Not Dis
CUSF	Sites	N	N		00000	N
CUSFLA	Sites by Product - ren...	N	N	PRPCDE,CNAME	00003	N
CUSFLB	Sites by Orig.List	N	N	LSLCDE,CNAME	00004	N
CUSFLC	Sites by Salesperson	N	N	SINIT,CNAME	00005	N
CUSFLD	Sites by Validator	N	N	VINIT,CNAME	00006	N
CUSFLE	Sites by Organisation	N	N	ORG,CNAME	00007	N
CUSFL1	Sites by Name	N	N	CNAME	00001	N
CUSFL2	Sites by Status	N	N	STATUS,CNAME	00008	N
CUSFL3	Sites by Number	Y	N	CUSNO	00002	N
CUSFL5	Sites by Dist.& Status	N	N	DSDCDE,STATU...	00009	N
CUSFL6	Sites By Dist.& Name	N	N	DSDCDE,CNAME	00010	N

In order to browse a source of any LF, double-click on it or select the **Zoom Source** option from the context menu.

Member X-Ref

The **Member X-Ref** option lists all source lines where the field/variable has been used/referenced, in the source member and its associated Device Files and Copybooks.

A wide variety of options can be specified including:

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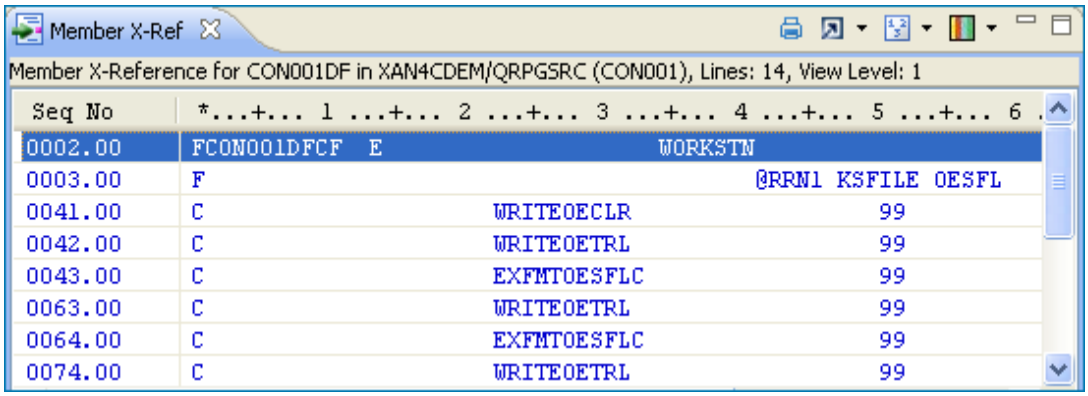
Files, Array Definitions, Data Structures, Sub-Fields of Data Structures, Indicators, Key Lists, Data Fields, File Formats, Subroutines, Program Variable, Array Elements, Parameter Lists, Parameters, Key Fields, Message Ids, EXCPT Names, etc.

Double-click on a field in source member displays Member X-Ref. Alternatively, choose the **Member X-Ref** option from the context menu.

When the **Member X-Ref** option is selected for a sub-item (such as a Sub-Field, Data Structure, Array Element or File Format), a list of the sub-items along with all references to the parent items is displayed. Double-click on the source line to view source of the object.

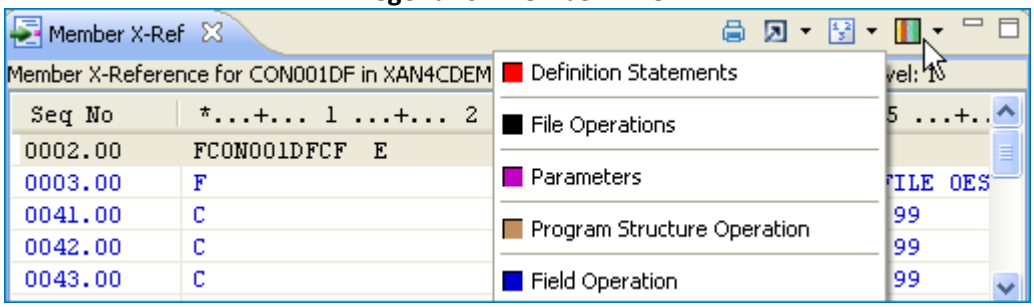
Member X-Ref view


Member X-Ref
Member X-Reference for CON001DF in XAN4CDEM/QRPGSRC (CON001), Lines: 14, View Level: 1
Seq No
*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6
0002.00 FCON001DFCF E WORKSTN
0003.00 F @RRN1 KSFILE OESFL
0041.00 C WRITEOECLR 99
0042.00 C WRITEOETRL 99
0043.00 C EXFMTOESFLC 99
0063.00 C WRITEOETRL 99
0064.00 C EXFMTOESFLC 99
0074.00 C WRITEOETRL 99

Legend

- Dark Red depicts the Definition Statements
- Black depicts the File Operations
- Magenta depicts the Parameters
- Dark Brown depicts the Program Structure Operation
- Dark Blue depicts the Field Operation.

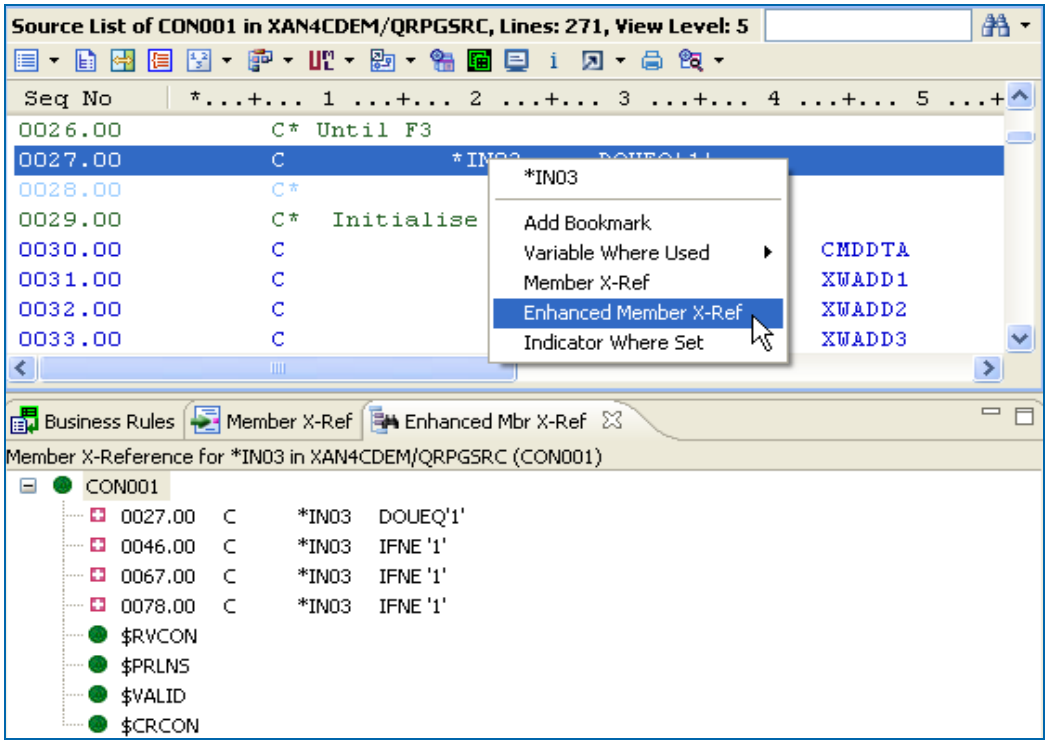
Legend for Member X-Ref



Enhanced Member X-Ref

The **Enhanced Member X-Ref** option displays the references of a variable in the member, along with the information about how each subroutine handles this variable. It also presents the logical order in which the variable actually gets used, and not in the order of how it is physically placed in the source.

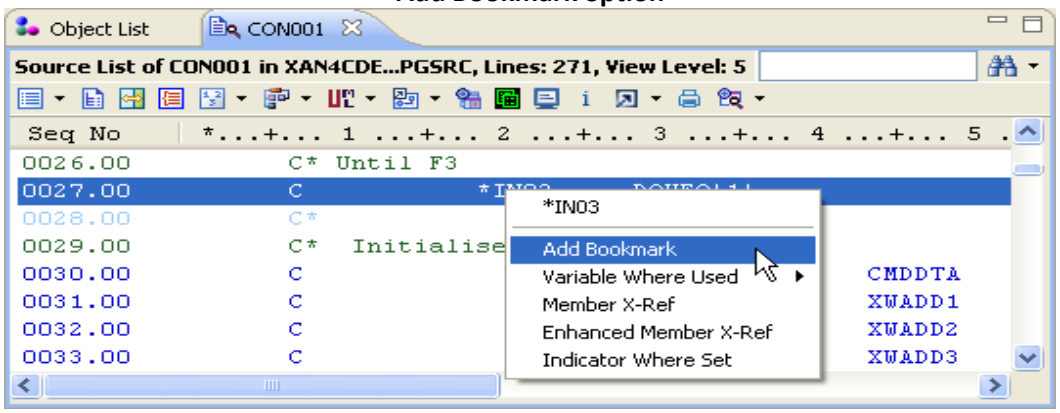
Enhanced Member X-Ref view



Add Bookmark

Use the **Add Bookmark** option to access the facility and bookmark a selected source line in the Source List view.

Add Bookmark option



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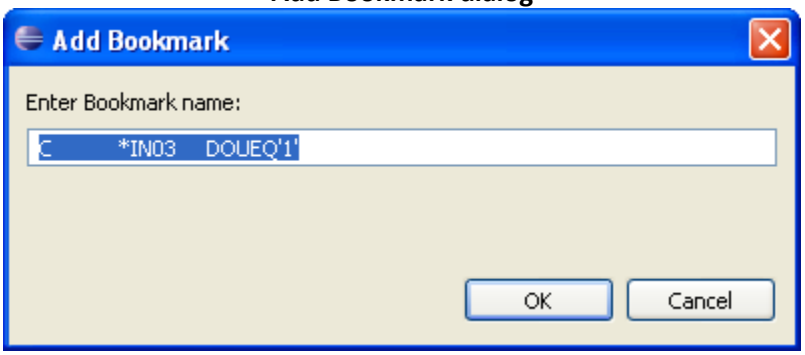
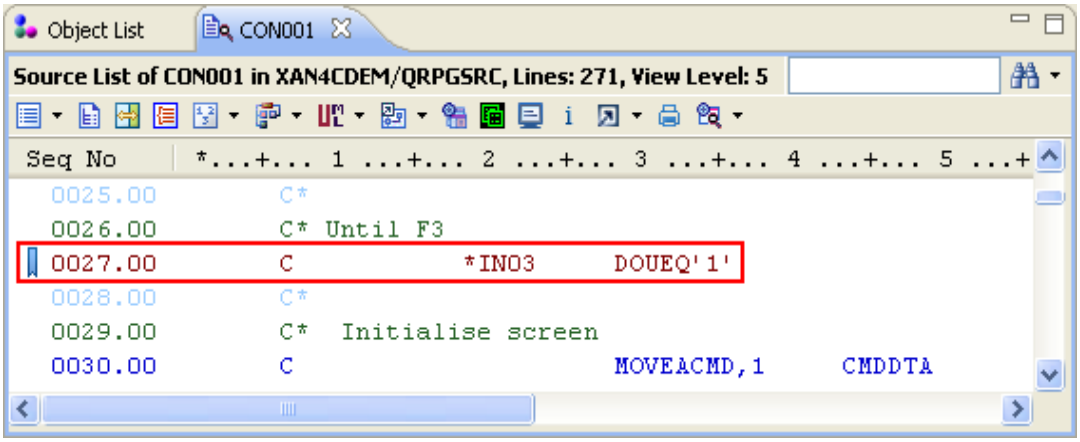
Select this option to invoke a dialog as shown below. You can edit the name of the Bookmark as per requirement.

Add Bookmark dialog



Click **OK** to bookmark the specific source line. The following image shows the bookmarked source line.

Bookmarked selection – *IN03


Object List
CON001
Source List of CON001 in XAN4CDEM/QRPGSRC, Lines: 271, View Level: 5
Seq No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+
0025.00 C*
0026.00 C* Until F3
0027.00 C *IN03 DOUEQ'1'
0028.00 C*
0029.00 C* Initialise screen
0030.00 C MOVEACMD,1 CMDDTA

To remove the bookmark, right-click on the bookmarked field and select the **Remove Bookmark** option or use the **Delete** option from the X-Analysis Bookmarks window.

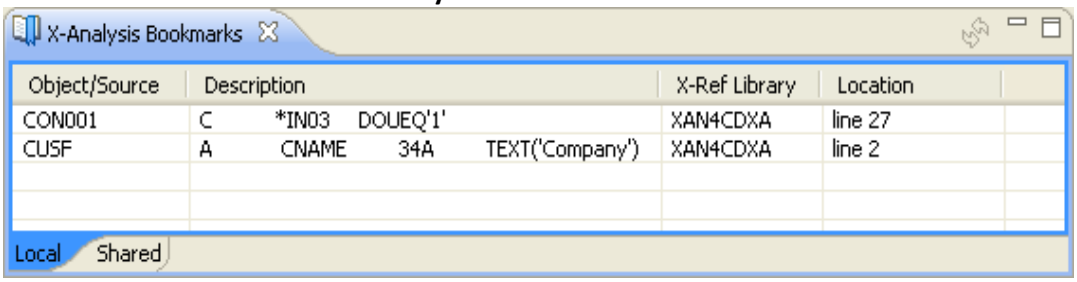
To view the bookmarked items, click the **X-Analysis Bookmarks** icon featured on the X-Analysis toolbar.

X-Analysis toolbar displaying the X-Analysis Bookmarks icon

X-Analysis - Source List of CON001 in XAN4CDEM/QRPGSRC, Lines: 271, View Level: 5...
File Edit Navigate Search Project X-Analysis Tomcat Run Window Help
X-Analysis Bookmarks
X-Analysis
Java

When the icon is clicked, the following window is invoked:

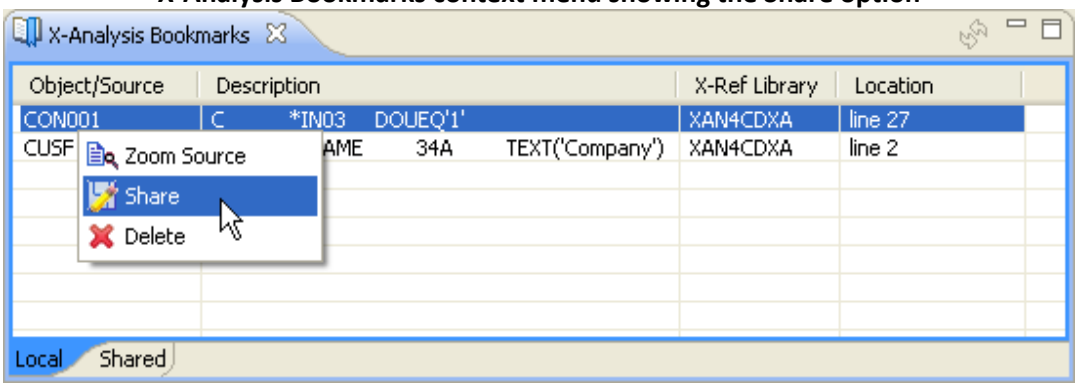
X-Analysis Bookmarks window



You also have the option to 'share' the bookmarks. When shared, the bookmarks become visible to others using the same cross-reference.

The following window displays the **Share** option:

X-Analysis Bookmarks context menu showing the Share option



Program Logic Documentation

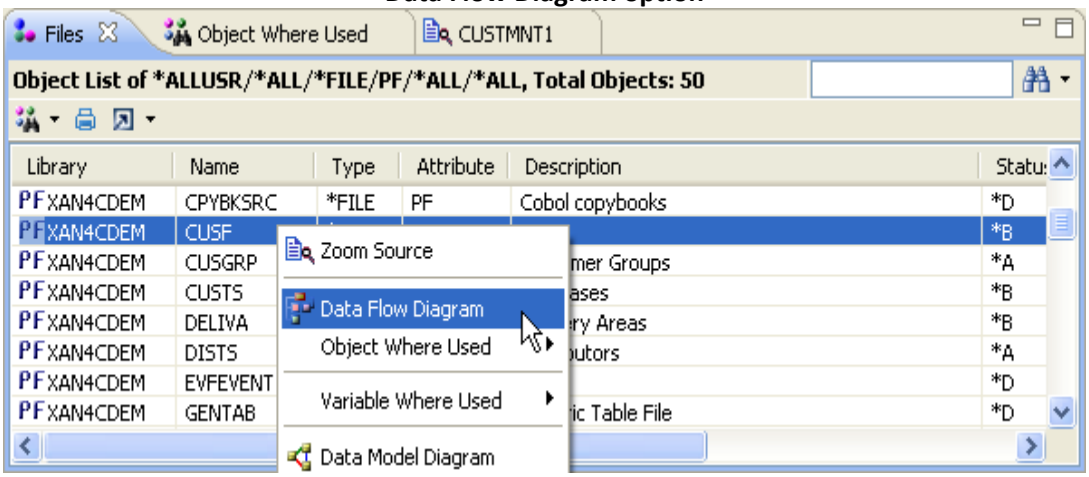
DATA FLOW DIAGRAM

A Data Flow Diagram or DFD is a diagrammatic representation of the data flow. A particular application contains many files and programs, and a DFD depicts all possible interrelationships among these multiple files and programs contained within a particular application. A color-coded DFD simultaneously plays the dual role of presenting the data flow at high object level, in addition to providing contextual details regarding specific variables and parameters passed between objects.

The Bus Routing DFD offers two benefits. One, it gives a precise idea of where and how the data that is input affects the output desired; two, it helps to visualize how an object within an application correlates with the other objects. The diagrams showing the data flow in neat blocks let even non-technical users get a clear picture of the object(s) interrelationships.

Select the **Data Flow Diagram** option from the context menu over an object, as shown below:

Data Flow Diagram option



This brings up the DFD for the object, **CUSF**.

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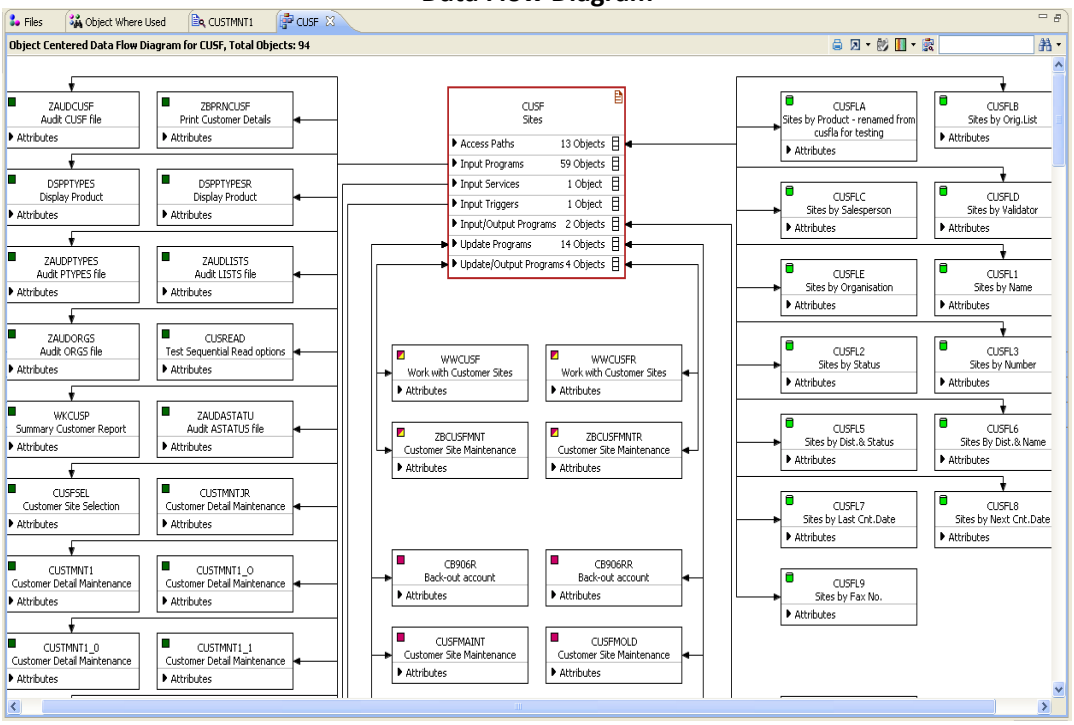
Data Flow Diagram



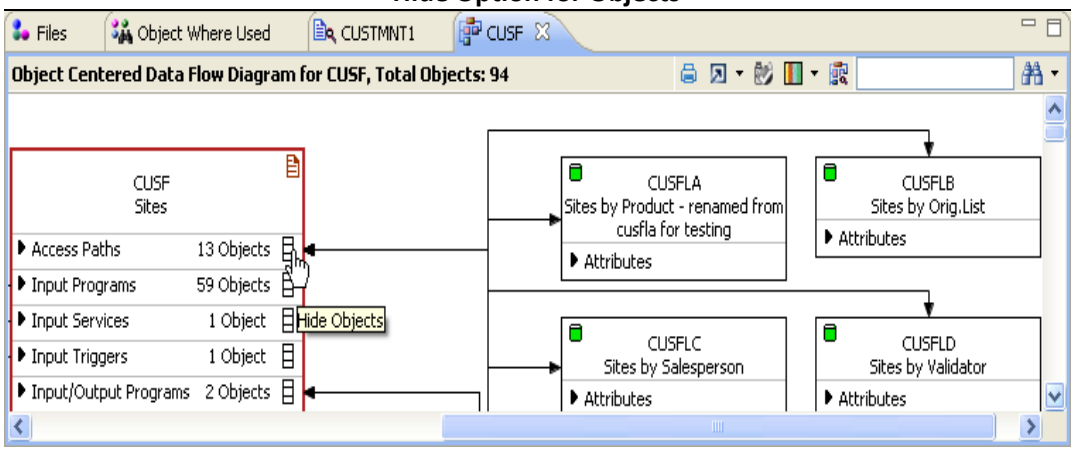
The DFD is also a graphic equivalent of the Object Where Used data. Besides the Logical Views/Access Paths for CUSF, you can see how CUSF fits into the application (i.e. the programs that update CUSF, programs that use CUSF as an input file and so on).

You will see how the dynamic and interactive diagram facilitates access to other features contained within an object. There are varied and flexible features and options like Hide/Show Objects, Expand/Collapse Referenced Objects, View Annotation, Attributes – all of these and more are explained ahead.

Hide/Show Objects

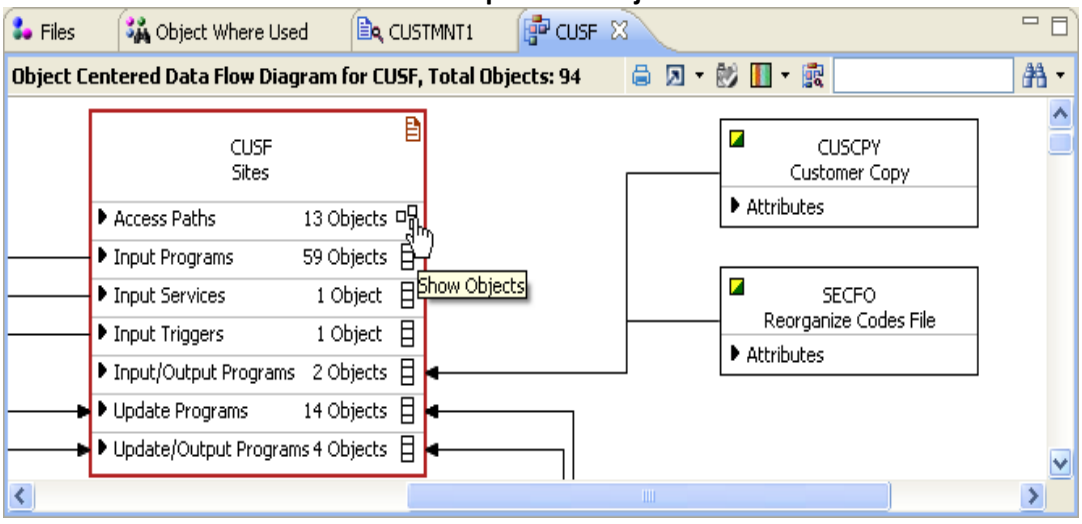
To have better understanding of object interrelationships, you may want to hide/show all objects pertaining to programs. A single-click action on the icon alongside the objects enables you to hide/show objects. In the following screenshot, the icon against **Access Paths** is clicked to hide objects.

Hide Option for Objects



The following screenshot shows how another click displays all the objects within.

Show Option for Objects



Expand/Collapse Referenced Objects

The DFD takes another dynamic form when you expand the referenced object(s) on selecting a particular category from the main object's box. The following screenshot displays the action to be performed:

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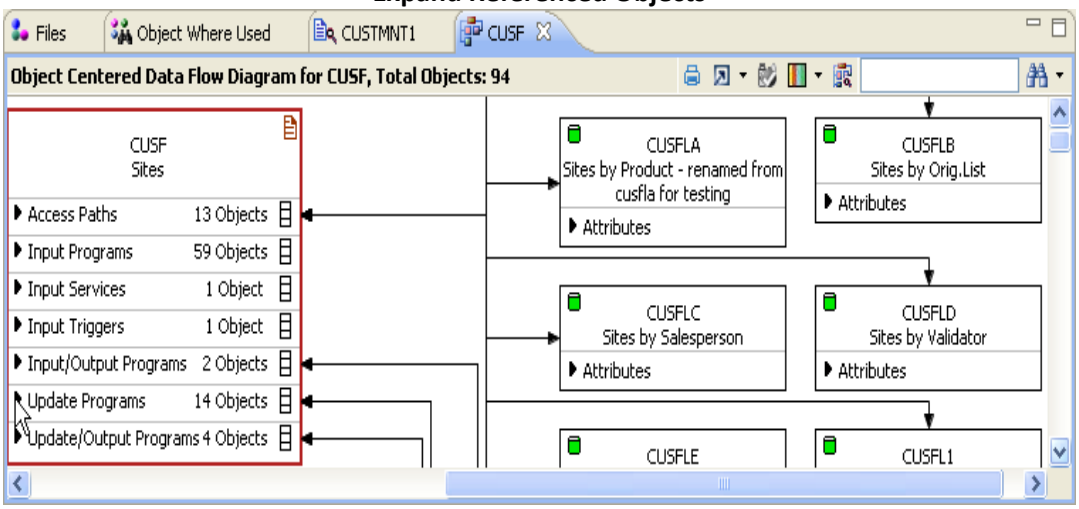
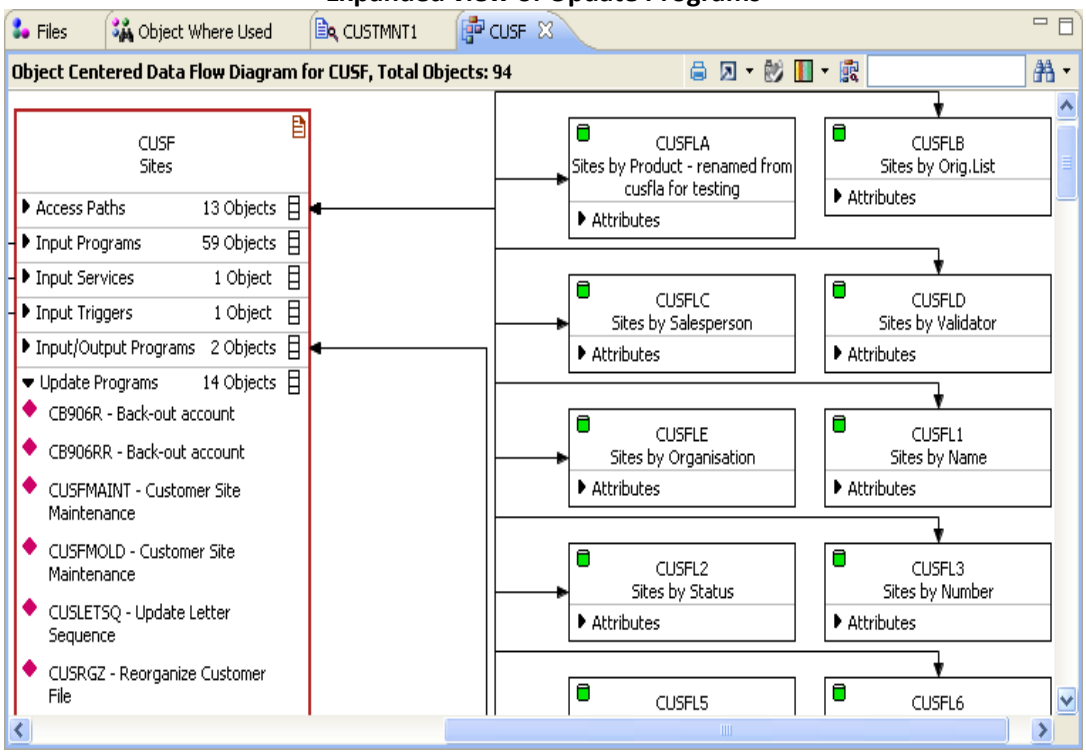
Expand Referenced Objects



A single-click on the arrow icon adjacent to **Update Programs** reveals all the ten objects updating **CUSF**. The following screenshot displays the expanded view of the referenced objects' list:

Expanded view of Update Programs



View Annotation

The **View Annotation** option allows user to see annotation for a specific object. There is a red icon denoting Annotated text, on the right side of the Object (see the following screenshot).

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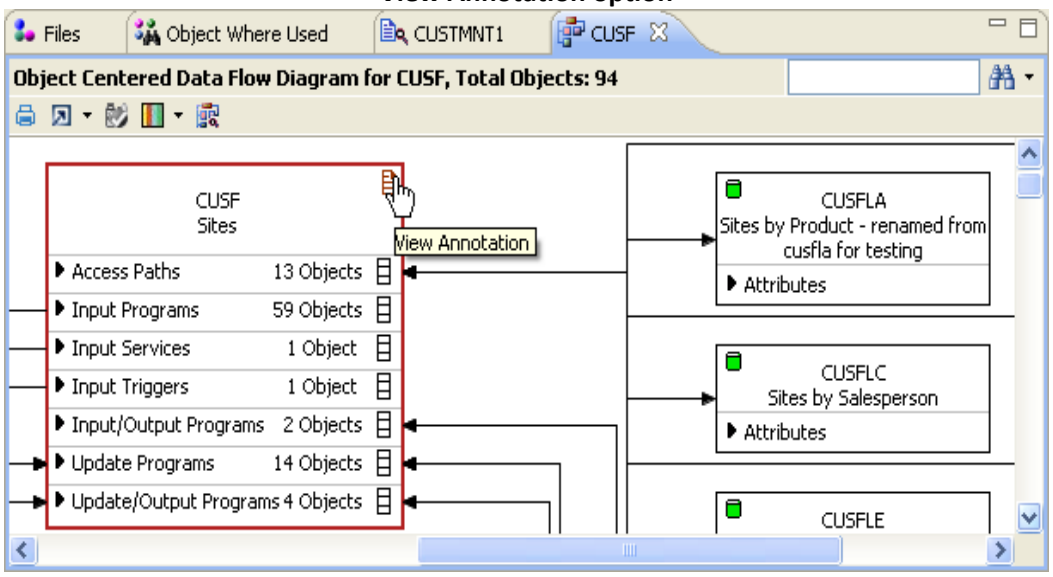
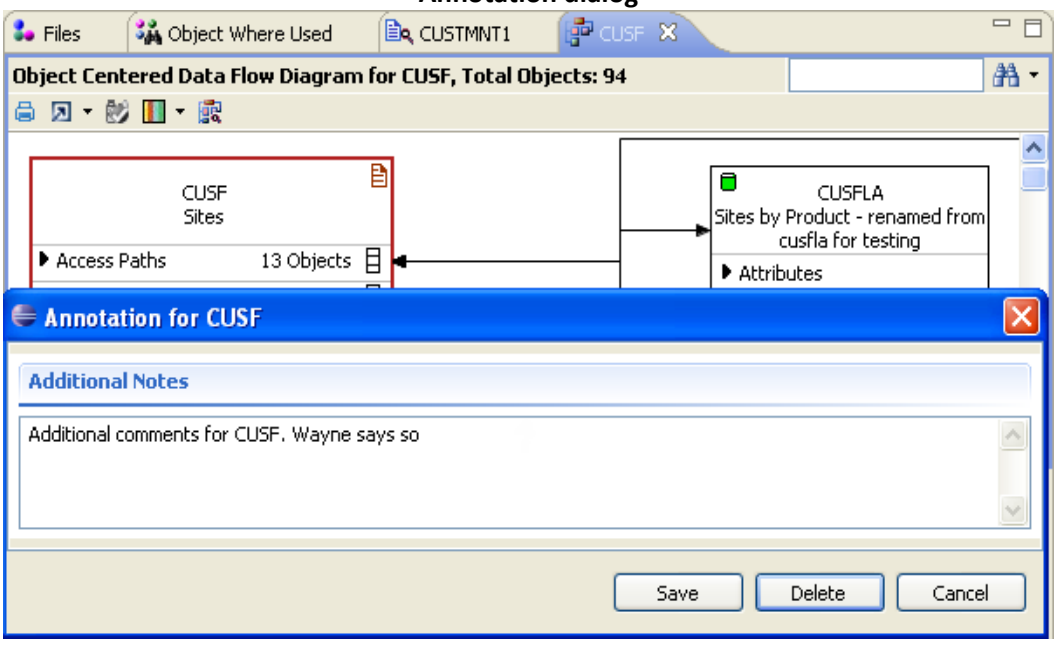
View Annotation option



Double-click on the **View Annotation** icon to invoke the Annotation dialog box, displaying the notes that had been written earlier.

You can further add/modify notes in the Annotation dialog box and click **Save**. These notes will be viewable later using the same option.

Annotation dialog



Attributes

The **Attributes** feature comprises the impacted fields of a particular object. Through these fields, the main object is referenced.

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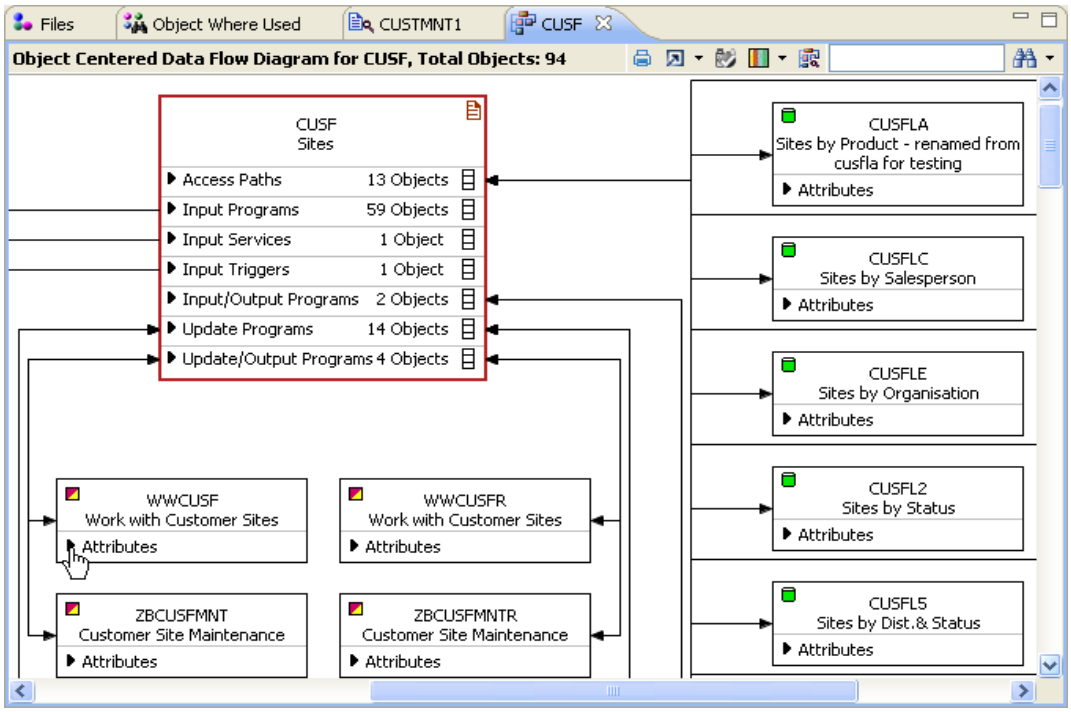
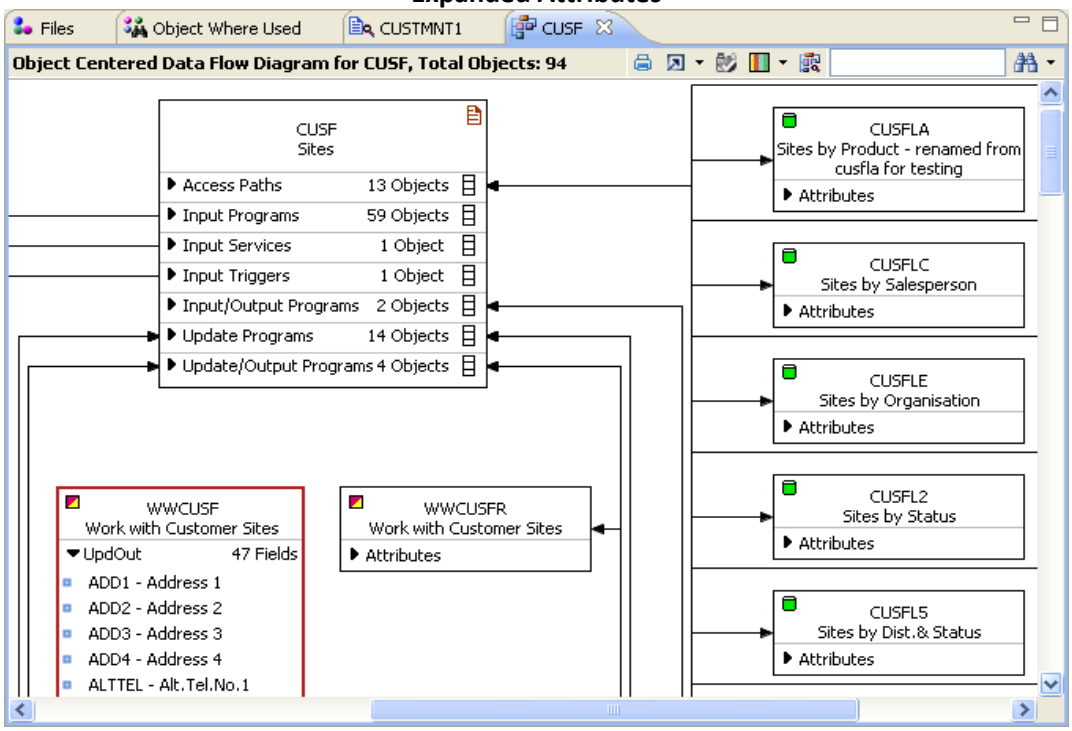
Attributes icon



The different objects corresponding to the main object have fields within them, implicit as 'Attributes'. These are easily accessible by a single-click on the **Attributes** icon. The term 'Attributes' is changed to related attribute – input, update, output etc., on expanding the **Attributes** button, as shown below:

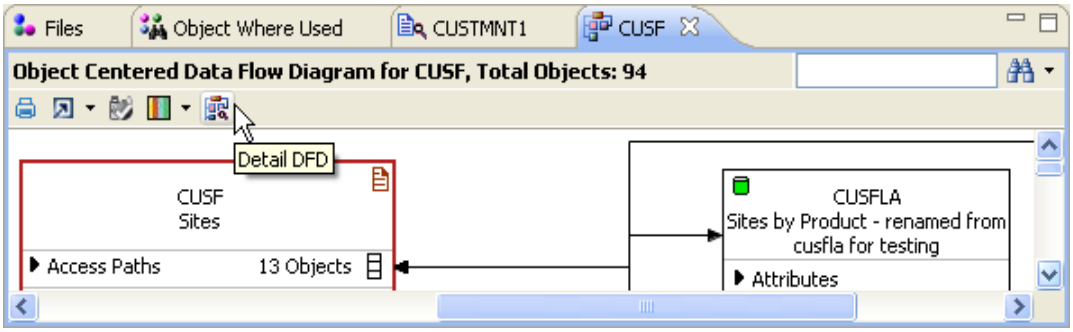
Expanded Attributes



Detail DFD icon

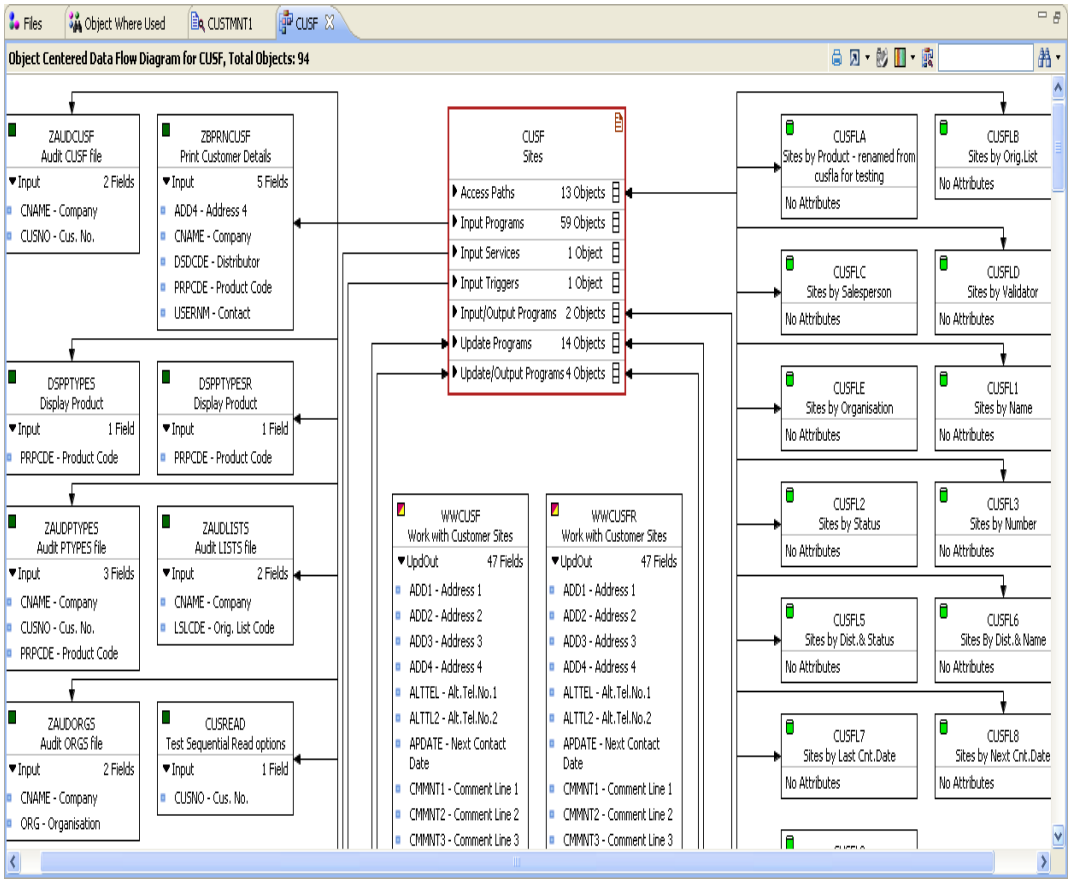
The **Detail DFD** presents the field usage of all the objects.

Detail DFD icon



When you click on the **Detail DFD** icon on the toolbar, the Attributes section of all the objects gets expanded displaying referred fields from all objects. The following screenshot displays the detailed DFD screen:

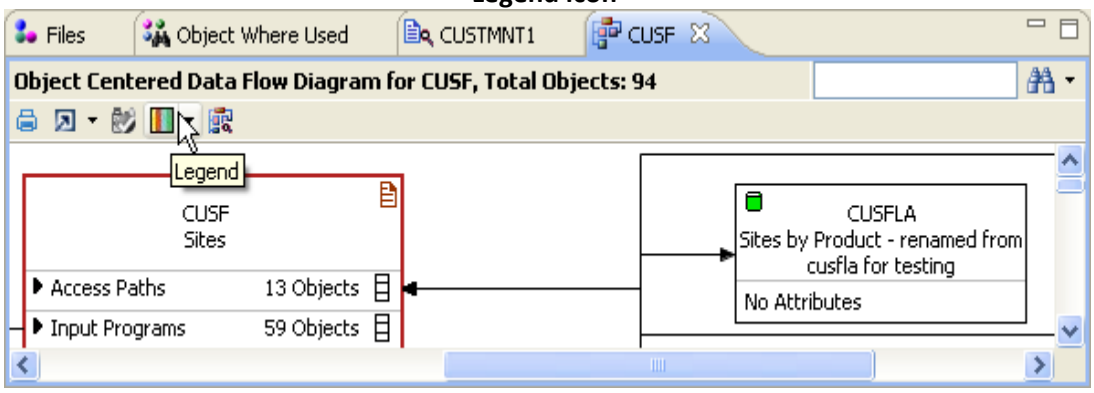
Detailed DFD view



Legend icon

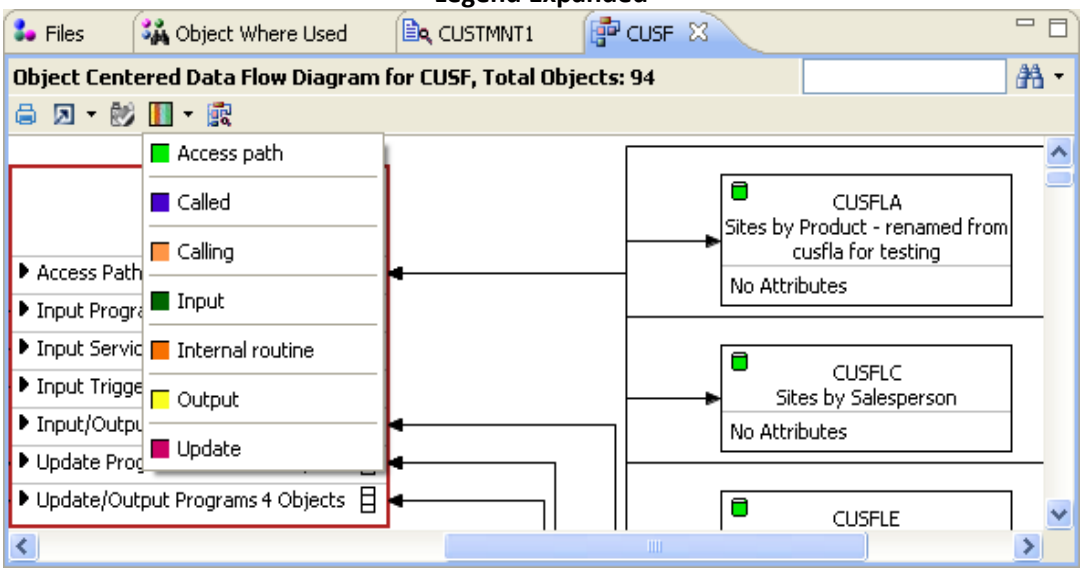
The **Legend** icon on the toolbar displays details of the color scheme used by the DFD. Click the icon shown below:

Legend icon



The color scheme helps you understand the reference and association of specific objects, like how each object is referred to or used by the main object on which the DFD was opted. The expanded view of the **Legend** is given underneath.

Legend Expanded



Each object box has a colored square or disk on the top left corner. A disk denotes that the object is a file, whereas a square denotes a program. The description of the DFD Legend is as follows:

- **Access Path** – This is the LF for the File on which the Data Flow Diagram has been opted.
- **Called** – This is to represent programs called by the main program.

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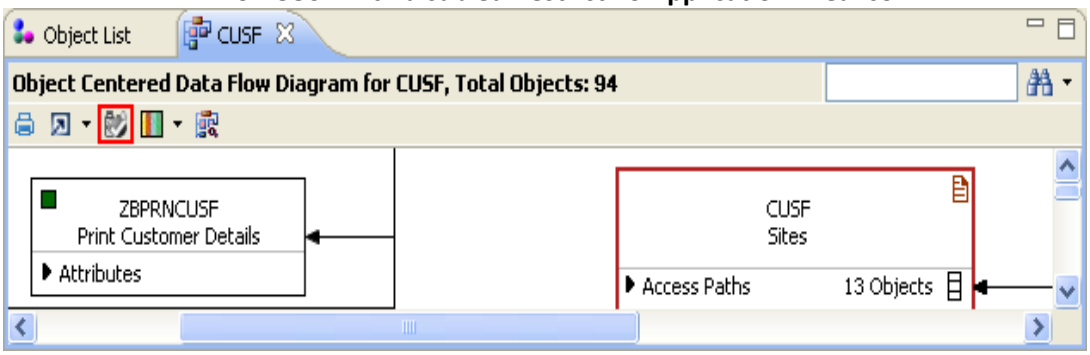
- **Calling** – This denotes the programs calling the main program.
- **Input** – For a program-centered DFD, this denotes an input file. For a file-centered DFD, this denotes a program taking input from the file.
- **Internal Routines** – These are Synon-specific routines being called from a 2E program.
- **Output** – For a program-centered DFD, this denotes an output file. For a file-centered DFD, this denotes a program giving output to the file.
- **Update** – For a program-centered DFD, this denotes an update file. For a file-centered DFD, this denotes a program updating the file.

DFD Restricted to an Application Area

X-Analysis provides an additional feature related to DFDs. You can restrict the DFDs to the selected application area by clicking on the **Restrict To Application Area** icon. On clicking the icon, only those child objects are displayed which belong to the selected application area.

The following screen displays the DFD on **CUSF**. Notice that the **Restrict To Application Area** icon is disabled. This is so because this option gets enabled when any application area is selected.

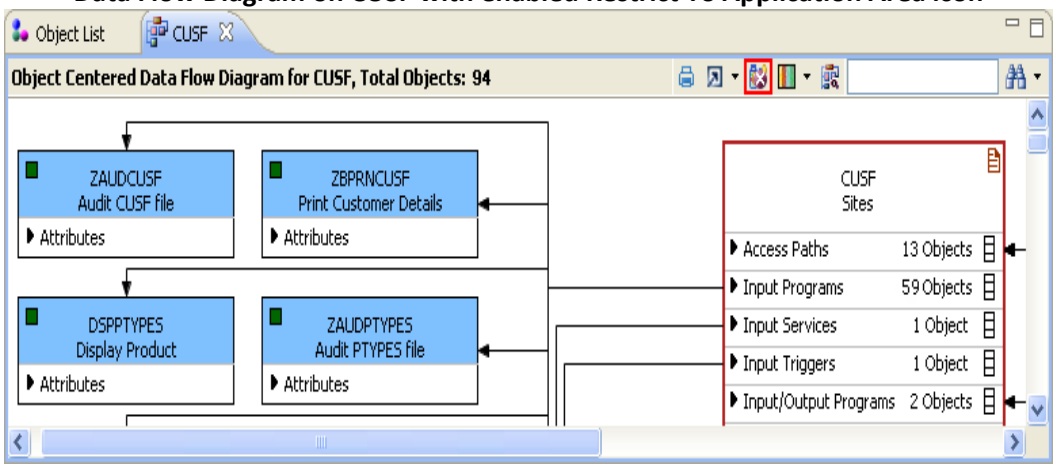
DFD on CUSF with disabled Restrict To Application Area icon



Now select the application area, **MVCPROCESS**.

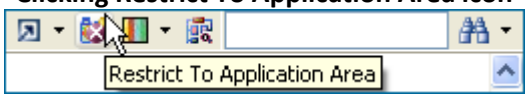
Select the **Data Flow Diagram** option on **CUSF**; notice that the **Restrict To Application Area** icon is enabled (see the following screen). This is so because you have selected an application area.

Data Flow Diagram on CUSF with enabled Restrict To Application Area icon



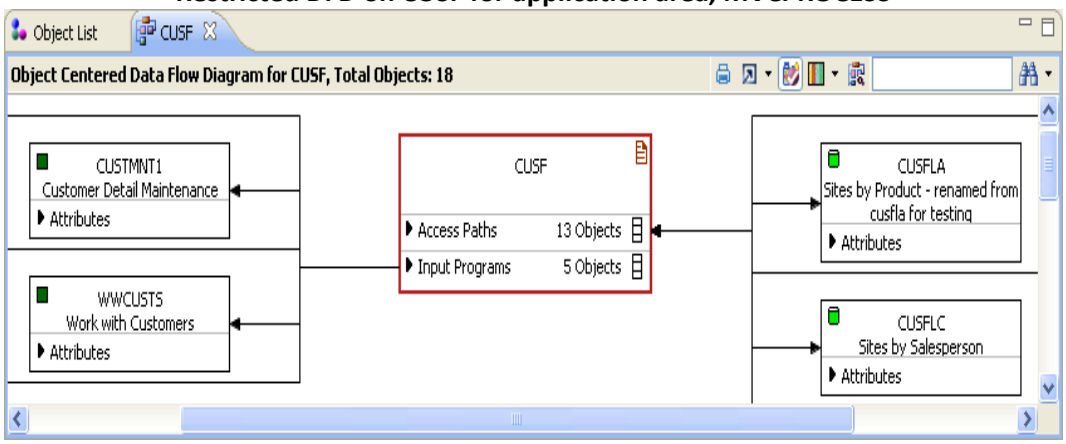
Now, click on the **Restrict To Application Area** icon as shown below:

Clicking Restrict To Application Area icon



The following screen is displayed:

Restricted DFD on CUSF for application area, MVCPROCESS



This tells us that the child objects belong to the application area, **MVCPROCESS**.

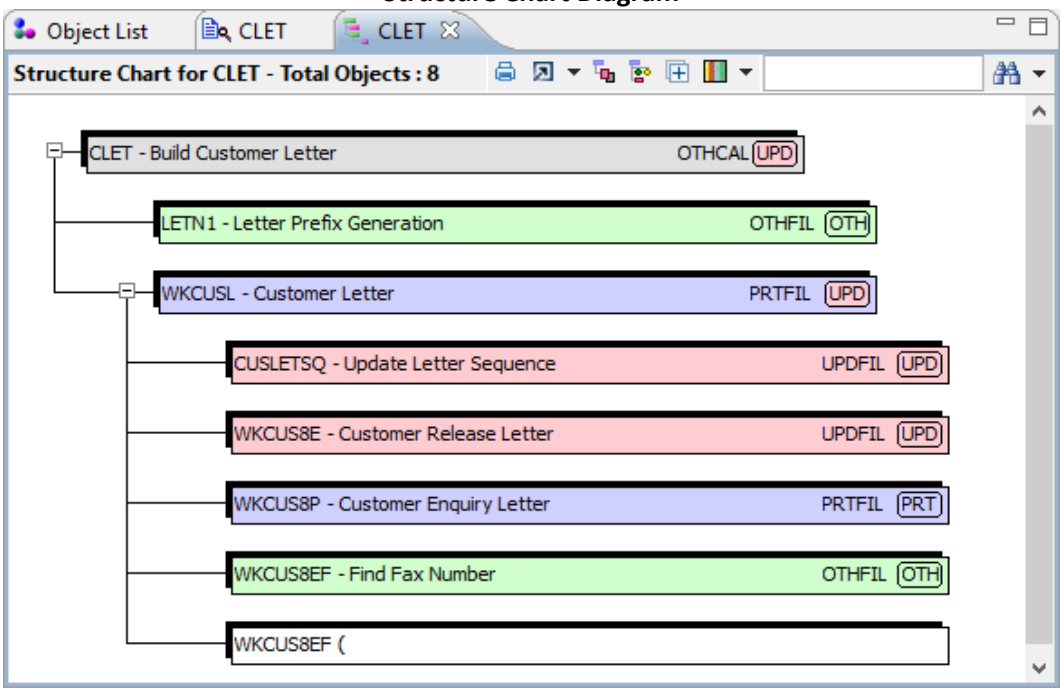
Note: While using the Restrict To Application Area feature, ensure that the originally-selected application area is not changed.

STRUCTURE CHART DIAGRAM

Before undertaking an elaborate exercise of documenting program logic, it is imperative to understand how control transfers from one program to the next. A Structure Chart Diagram or SCD addresses this issue and represents the control through graphical, color-coded block diagrams. Broadly speaking, the SCD is a nested tree diagram that shows the

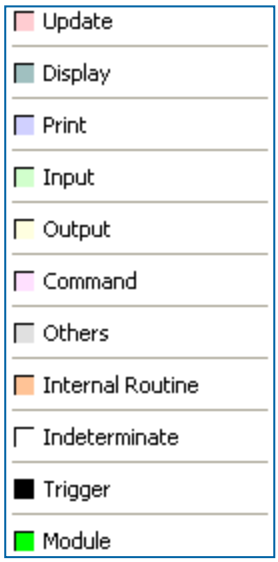
complete call hierarchy of the 'programs called'. These diagrams contain all the relevant information as per control flow and call structure. Moreover, you can view data input objects and avail a summarized description for each of the objects. Important functional aspects like updates, prints and displays are color coded to help you instantly focus on these commonly preferred details.

Structure Chart Diagram



Legend

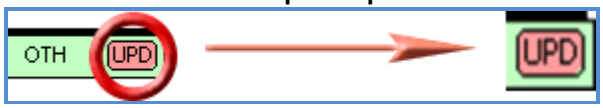
The SCD Legend describes the type of object displayed.



- **Update** – This depicts the program that updates a file.
- **Display** – This depicts the program that uses a Display file.
- **Print** – This depicts the program that uses a Print file.
- **Input** – This depicts the program that uses an Input file.
- **Output** – This depicts the program that writes to a file.
- **Command** – This simply depicts a Command.
- **Others** – This refers to the Programs where it is referring to a file which is not Update/Display/Print/Input/Output.
- **Internal Routine** – This refers to the Synon-specific routines.

- **Indeterminate** – This depicts the programs where the usage cannot be programmatically determined.
- **Trigger** – This depicts the program which is a Trigger.
- **Module** – This depicts the program which is a Module.

Rollup Group



The Rollup group describes the cumulative component function of the program and its dependents.

The following types of Rollup groups are available:

- UPD – At least one program updates a file.
- PRT – Program and dependent programs create a printed report.
- DSP – Program and dependent programs use input files and display files.
- OTH – No cumulative component function can be determined.

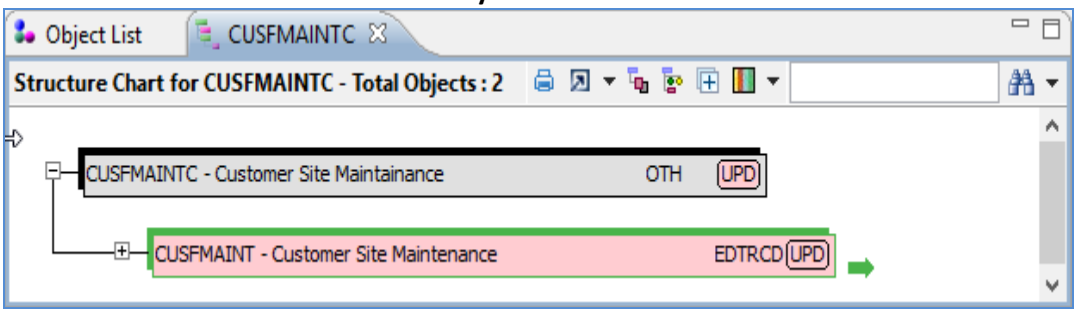
Function Type

Function Type describes the function of the object and is based on COOL: 2E definitions.

Hierarchy Exclusions in SCD

Work with Exclusions is **Option 16** on the **X4WRKAPP** master command menu. With the help of this feature you can add a program's name for Hierarchy Exclusions. This has effect in the SCD and the OSC. This feature removes the child nodes of the excluded object and a green arrow is displayed to indicate the hierarchy exclusion. The following screen shows this feature.

Hierarchy Exclusions in SCD



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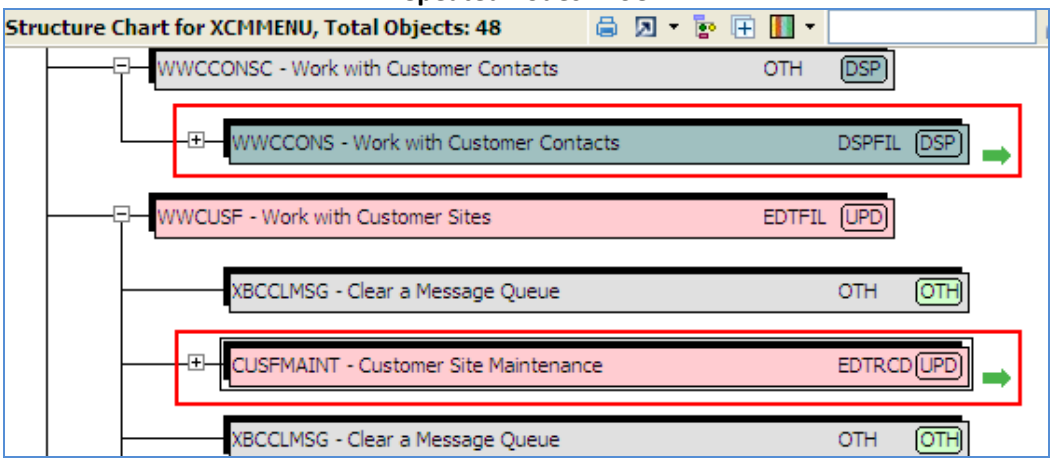
Repeated nodes in SCD

The SCD displays the repeated objects (having child nodes) with a green arrow beside them. The following image shows the repeated nodes in an SCD.

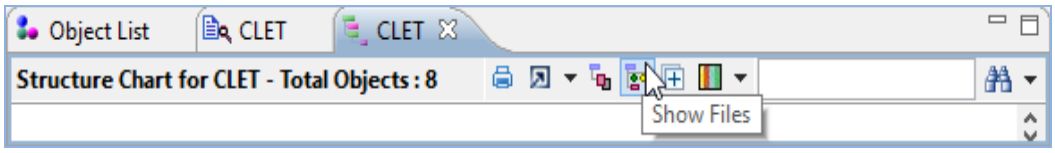
Repeated nodes in SCD


Structure Chart for XCMMENU, Total Objects: 48
WWCCONSC - Work with Customer Contacts OTH DSP
WWCCONS - Work with Customer Contacts DSPFIL DSP
WWCUSF - Work with Customer Sites EDTFIL UPD
XBCCLMSG - Clear a Message Queue OTH OTH
CUSFMAINT - Customer Site Maintenance EDTRCD UPD
XBCCLMSG - Clear a Message Queue OTH OTH

Structure Chart Diagram with Files

The SCD provides a graphic display of the program-to-program relationships. The SCD with files also displays associated files along with programs. To see the SCD with files, click on the **Show Files** icon available on the SCD toolbar.

Show Files icon



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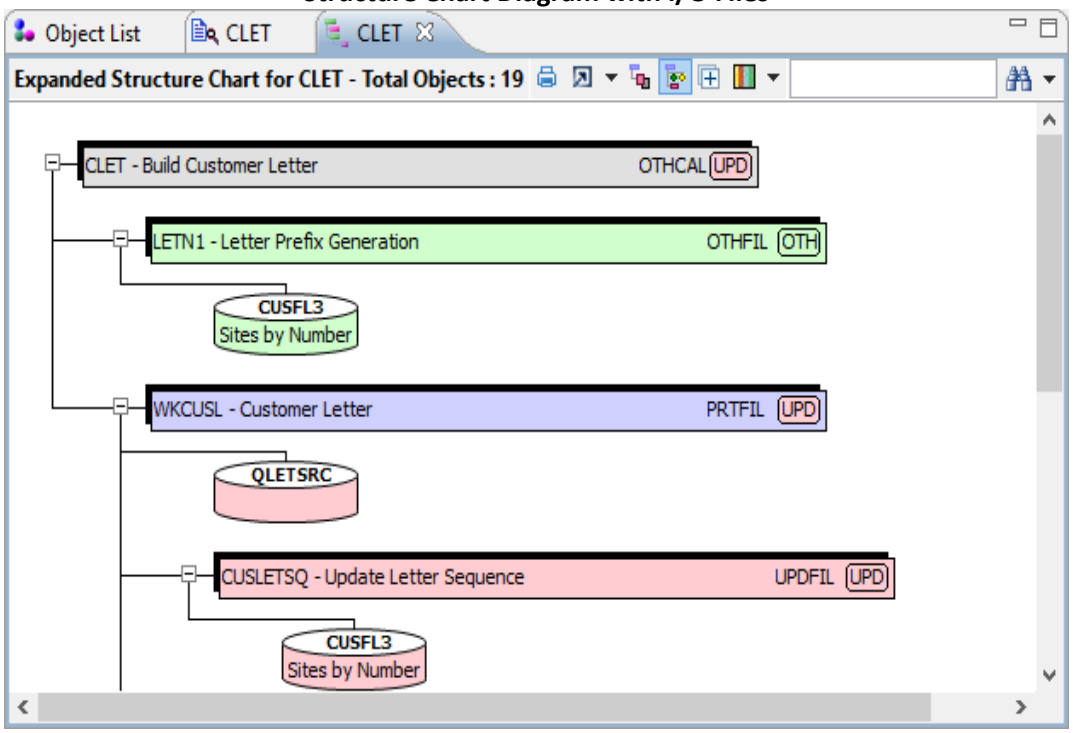
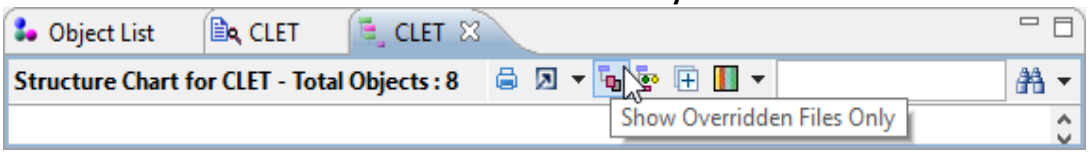
Structure Chart Diagram with I/O Files



Structure Chart Diagram – Show Overridden Files Only

In the case of only **CLP/CLLE** objects, the SCD has the feature that displays the Overridden Files. The following image shows the **Show Overridden Files Only** icon.

Show Overridden Files Only icon



When the icon is clicked, the following window is displayed:

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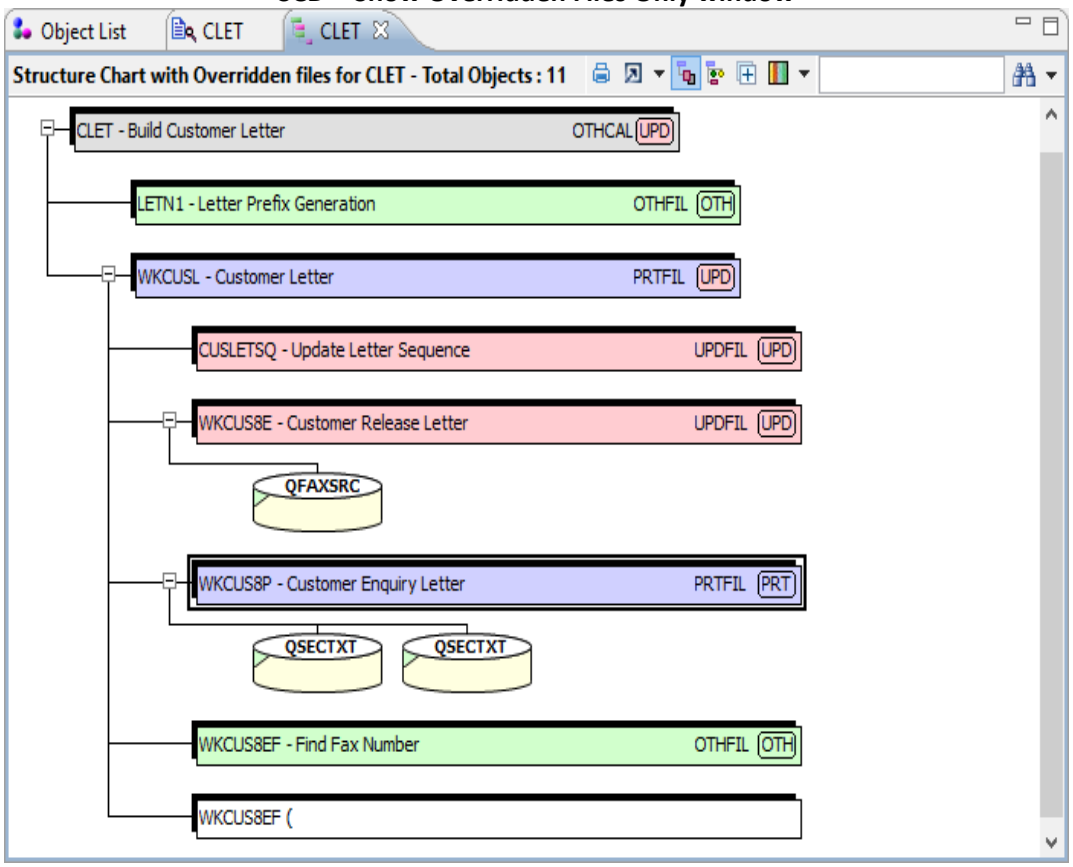
SCD – Show Overridden Files Only window

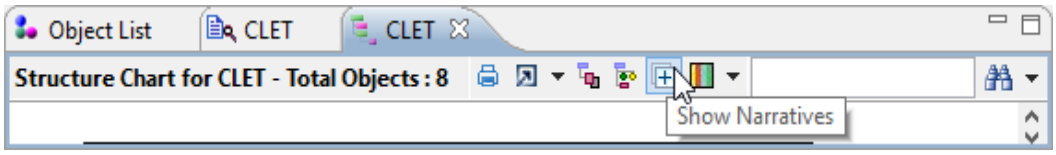


Detailed Structure Chart

Generate the Detailed SCD by clicking the **Show Narratives** icon from the toolbar of both the SCD and the Expanded Structure Chart Diagram.

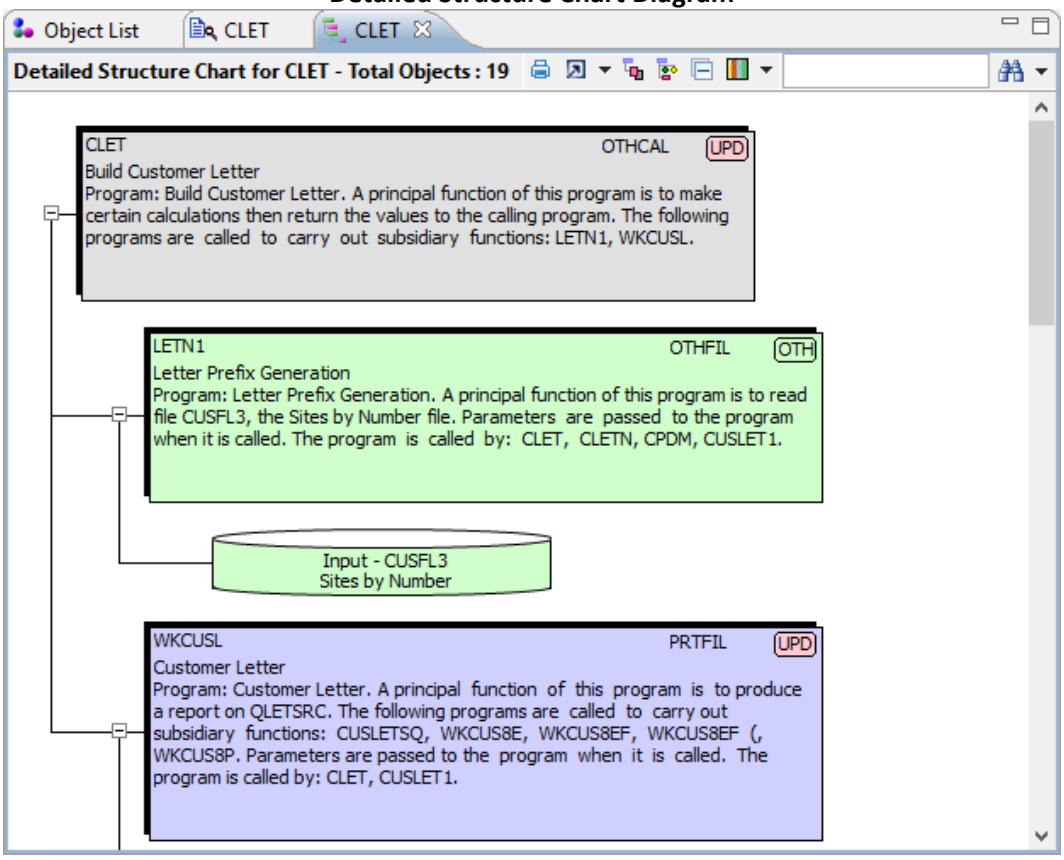
The following image shows the icon.

Show Narratives icon

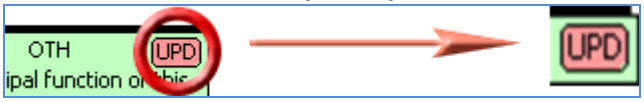


The image below shows the detailed SCD for the selected object, **CLET**.

Detailed Structure Chart Diagram


Object List
CLET
CLET
Detailed Structure Chart for CLET - Total Objects : 19
CLET
OTHCAL
UPD
Build Customer Letter
Program: Build Customer Letter. A principal function of this program is to make certain calculations then return the values to the calling program. The following programs are called to carry out subsidiary functions: LETN1, WKCUSL.
LETN1
OTHFIL
OTH
Letter Prefix Generation
Program: Letter Prefix Generation. A principal function of this program is to read file CUSFL3, the Sites by Number file. Parameters are passed to the program when it is called. The program is called by: CLET, CLETN, CPDM, CUSLET1.
Input - CUSFL3
Sites by Number
WKCUSL
PRTFIL
UPD
Customer Letter
Program: Customer Letter. A principal function of this program is to produce a report on QLETSRC. The following programs are called to carry out subsidiary functions: CUSLETSQ, WKCUS8E, WKCUS8EF, WKCUS8EF (, WKCUS8P. Parameters are passed to the program when it is called. The program is called by: CLET, CUSLET1.

Rollup Group



The Rollup group describes the cumulative component function of the program and its dependents.

The following types of Rollup groups are available:

- UPD – At least one program updates a file.
- PRT – Program and dependent programs create a printed report.
- DSP – Program and dependent programs use input files and display files

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- OTH – No cumulative component function can be determined

Function Type

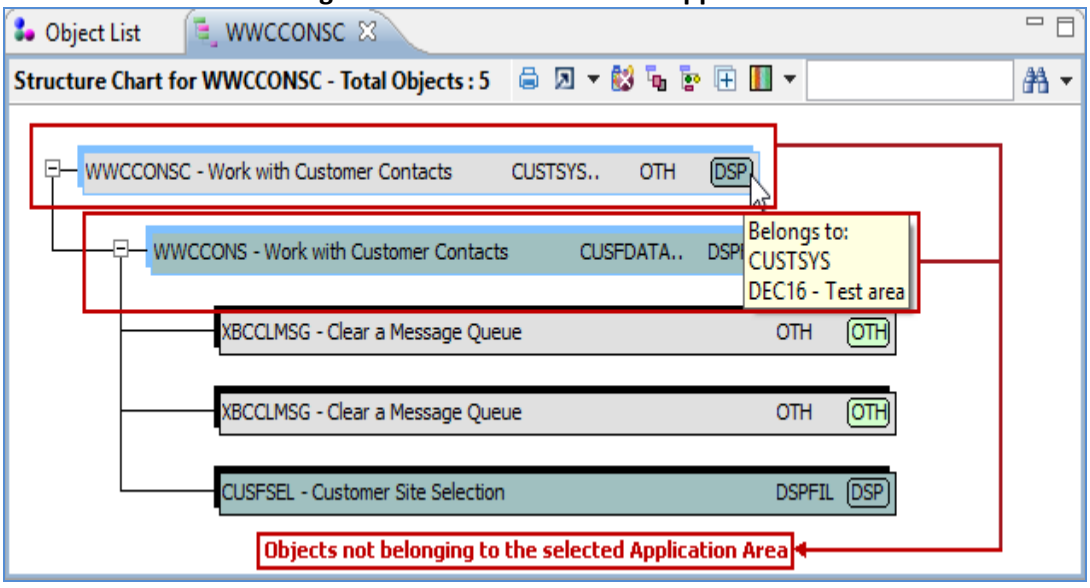
Function Type describes the function of the object and is based on COOL: 2E definitions.

Application Area SCD

When you select the **Structure Chart Diagram** option on an application area (the application area node should be selected), then objects not belonging to the selected application area are highlighted in blue. The names of the application areas are displayed on the tool tip of those objects which do not belong to the selected application area.

While using the Restrict To Application Area feature, ensure that the originally-selected application area remains the same.

Structure Chart Diagram for WWCCONSC when Application Area is selected

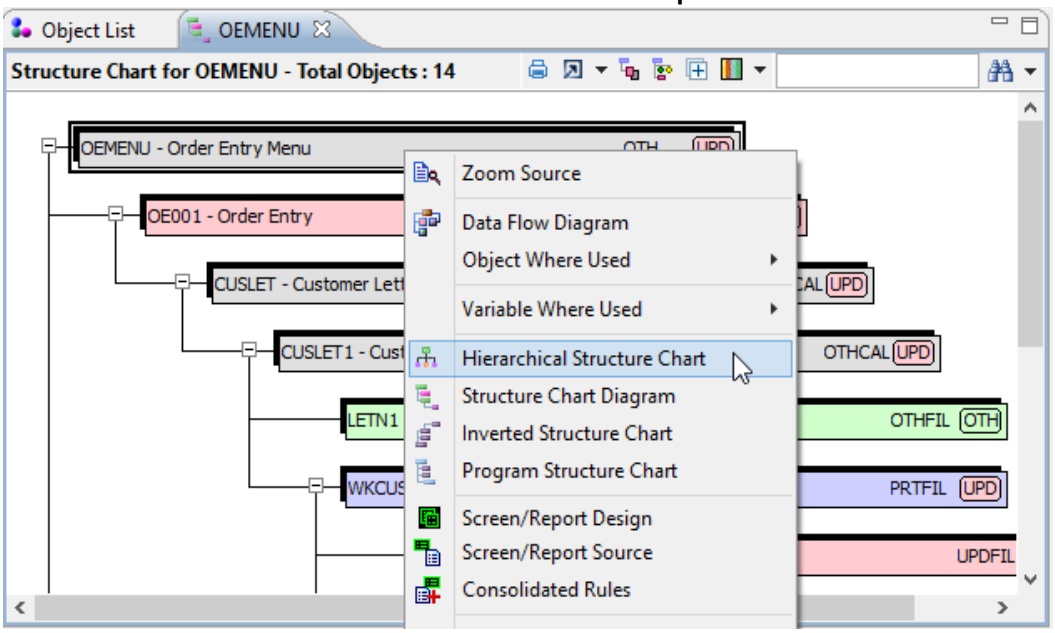

Object List
WWCCONSC
Structure Chart for WWCCONSC - Total Objects : 5
WWCCONSC - Work with Customer Contacts CUSTSYS.. OTH DSP
WWCCONS - Work with Customer Contacts CUSFDATA.. DSP
Belongs to:
CUSTSYS
DEC16 - Test area
XBCCLMSG - Clear a Message Queue OTH OTH
XBCCLMSG - Clear a Message Queue OTH OTH
CUSFSEL - Customer Site Selection DSPFIL DSP
Objects not belonging to the selected Application Area

Note that the SCD can be limited by level as well as volume. This is applicable to the interactive mode of SCDs. You must set the 'Preferred Volume Limit' in the X-Analysis General Preferences dialog.

Hierarchical Structure Chart Diagram

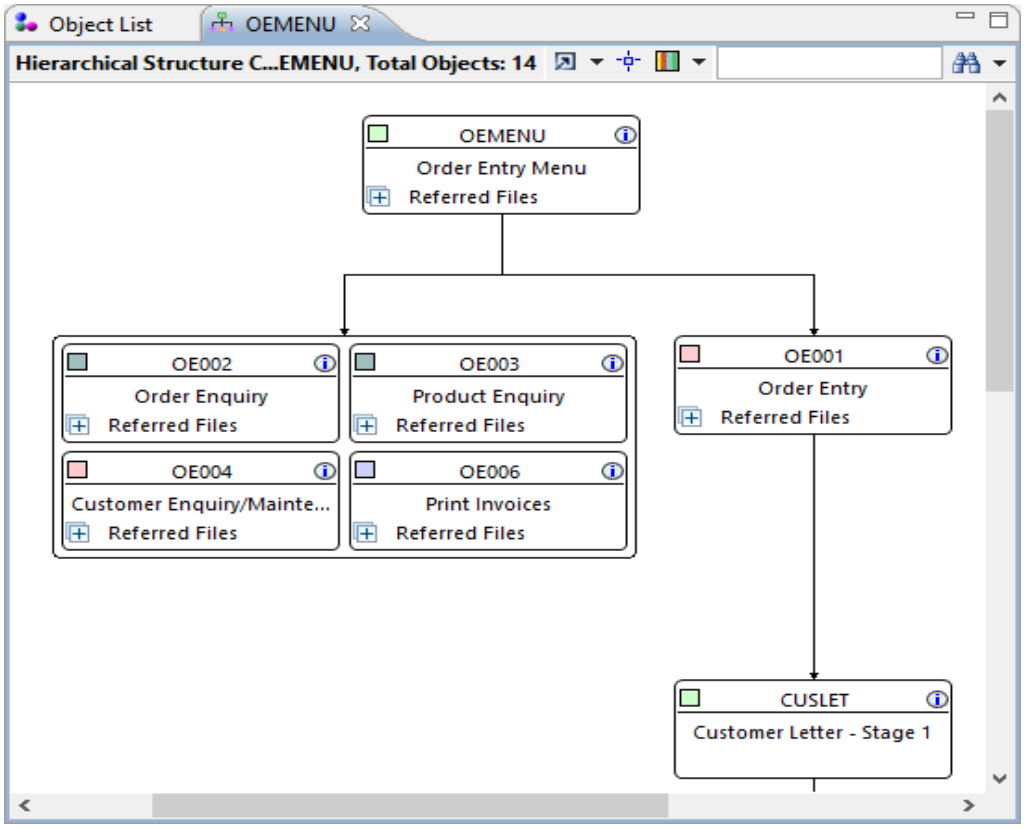
The Hierarchical Structure Chart Diagram offers a different layout for viewing the SCD. This illustration offers a well-defined view of all the programs by representing their control flow and call structure. Neat, color-coded bus routing block diagrams depict the movement of control / programs. Select the **Hierarchical Structure Chart** option for any object from the context menu. In the following screenshot, **OEMENU** is selected.

Hierarchical Structure Chart option



The screenshot below shows the delineation of the main object **OEMENU** into several blocks of related objects in the order of calling. The color codes signify the identity of objects as command-based or input-based or print-based, and so on.

Hierarchical Structure Chart



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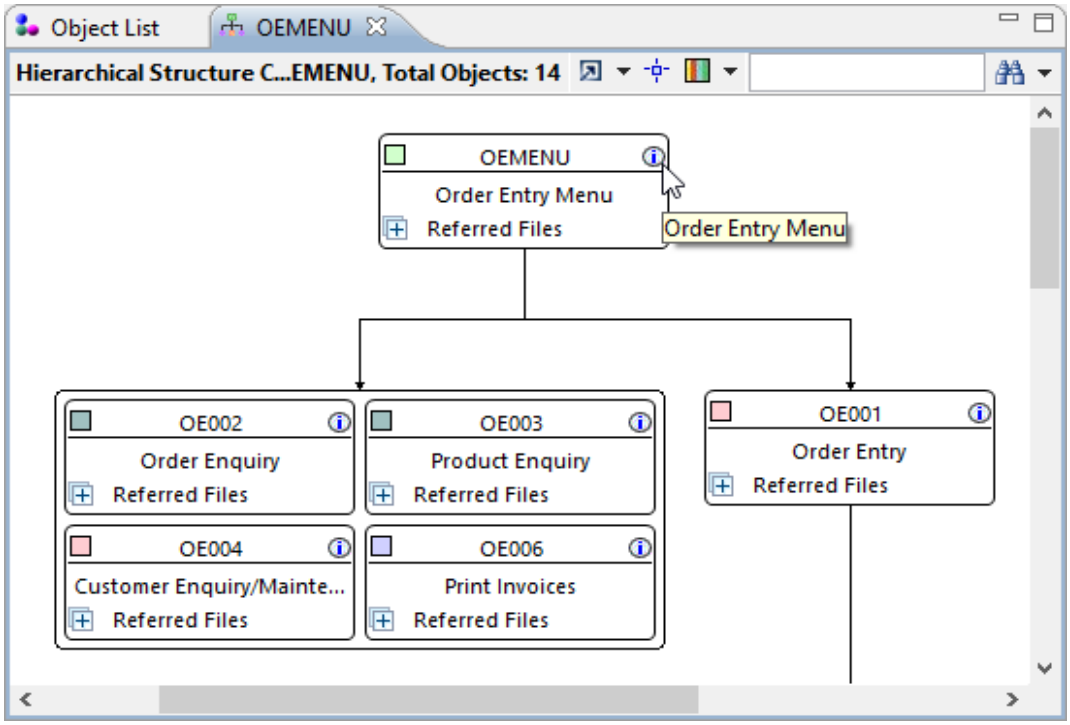
Narration

Access the additional details related to an object through the ⓘ icon.

Narratives icon



Click on the icon to invoke a pop-up window which provides the auto-generated narration for the program, as shown below:

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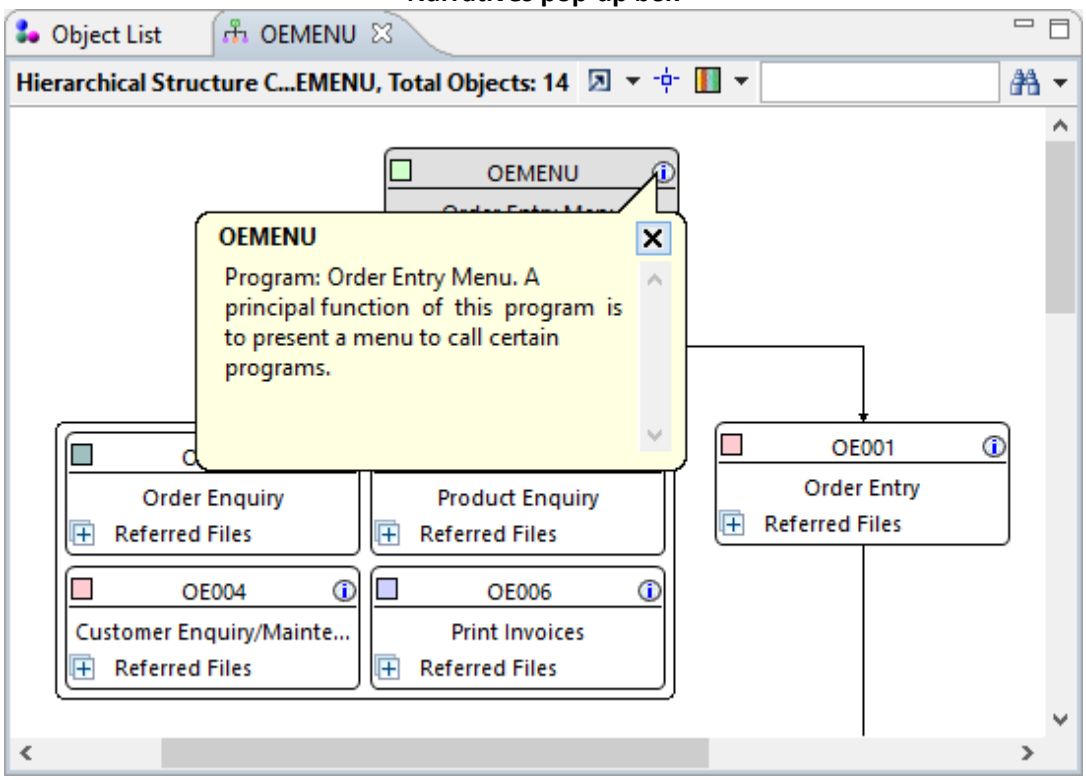
Narratives pop-up box



Referred Files

The Hierarchical Structure Chart has a feature which displays the referred files inline. An expandable icon called **Referred Files** is available in each box. Click on the ⊞ icon preceding **Referred Files.**

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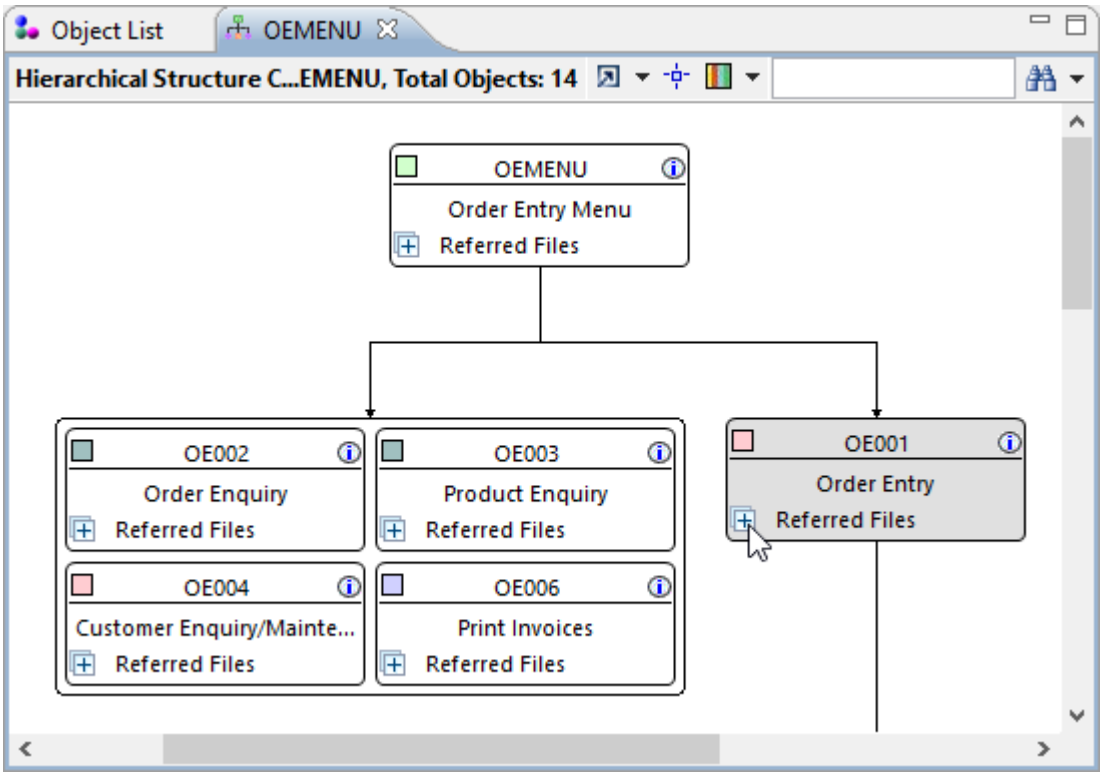
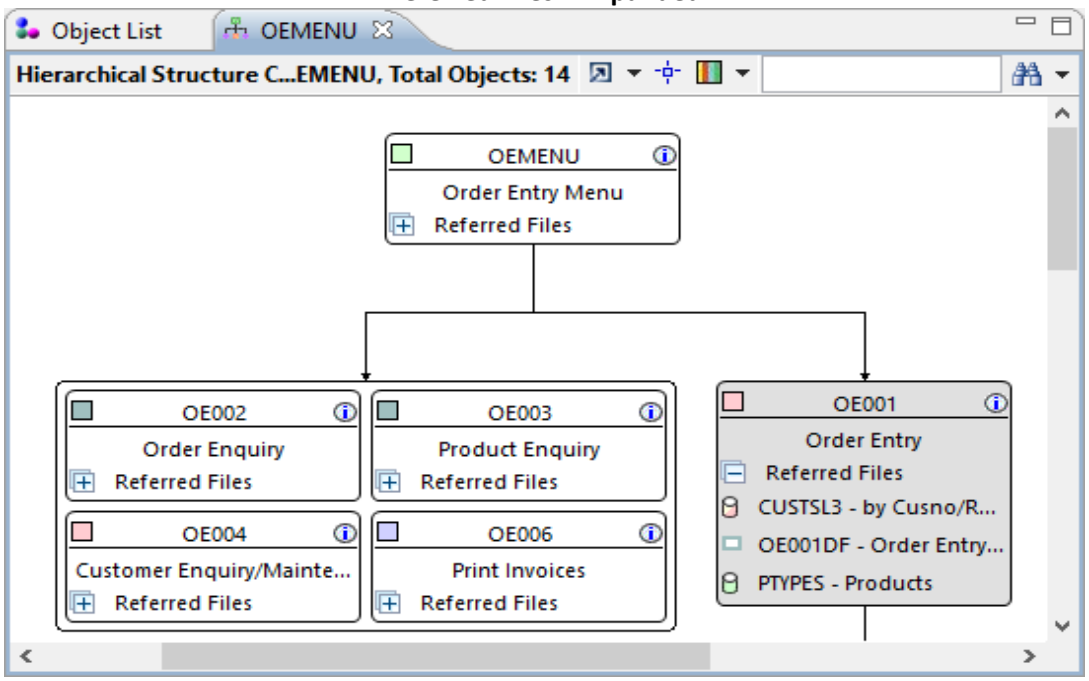
Referred Files



The box will expand to display the files referred to by **OE001**. The color-coded geometric shape before the file name indicates the file type.

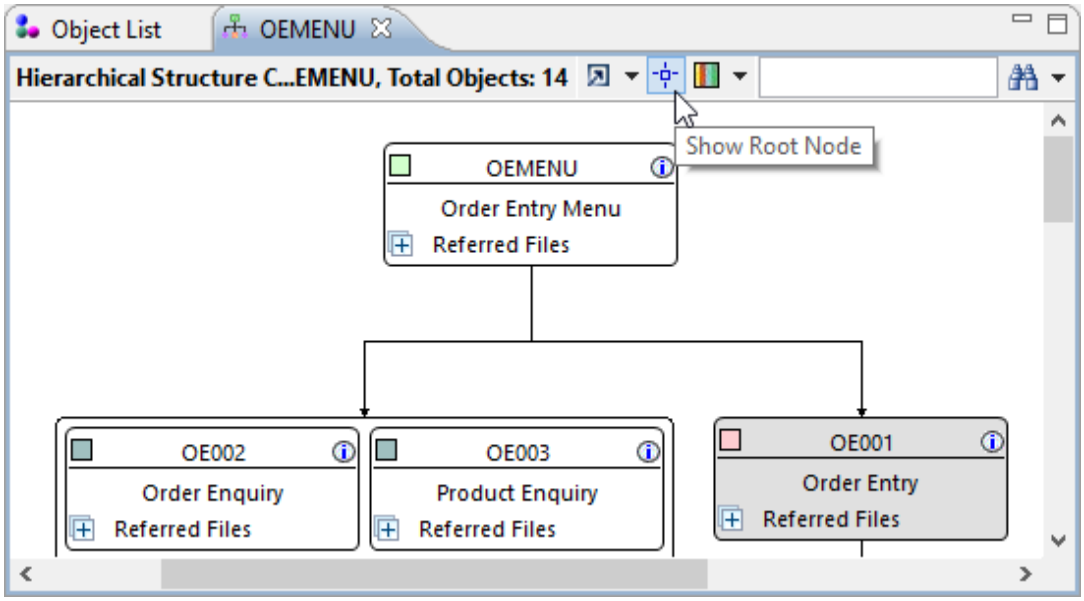
Referred Files – Expanded



Show Root Node

Click the **Show Root Node** icon to display the root node:

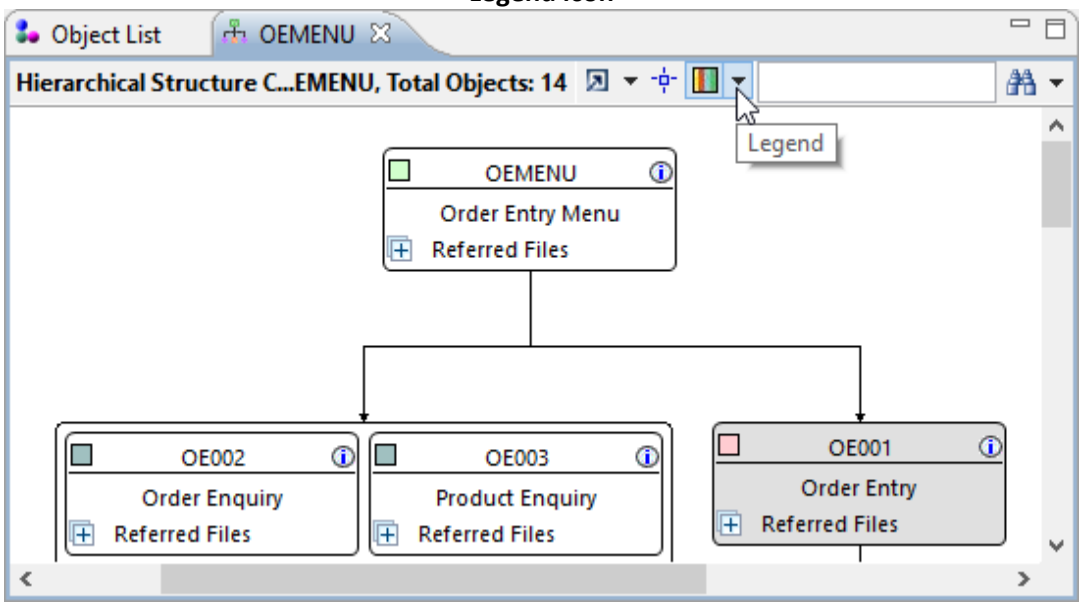
Show Root Node icon



Legend icon

The **Legend** icon on the toolbar displays details of the color scheme used by the Hierarchical SCD. The colors help in establishing the reference and association of specific objects. Click the **Legend** icon, as shown below:

Legend icon



The following image shows the expanded view of the Legend:

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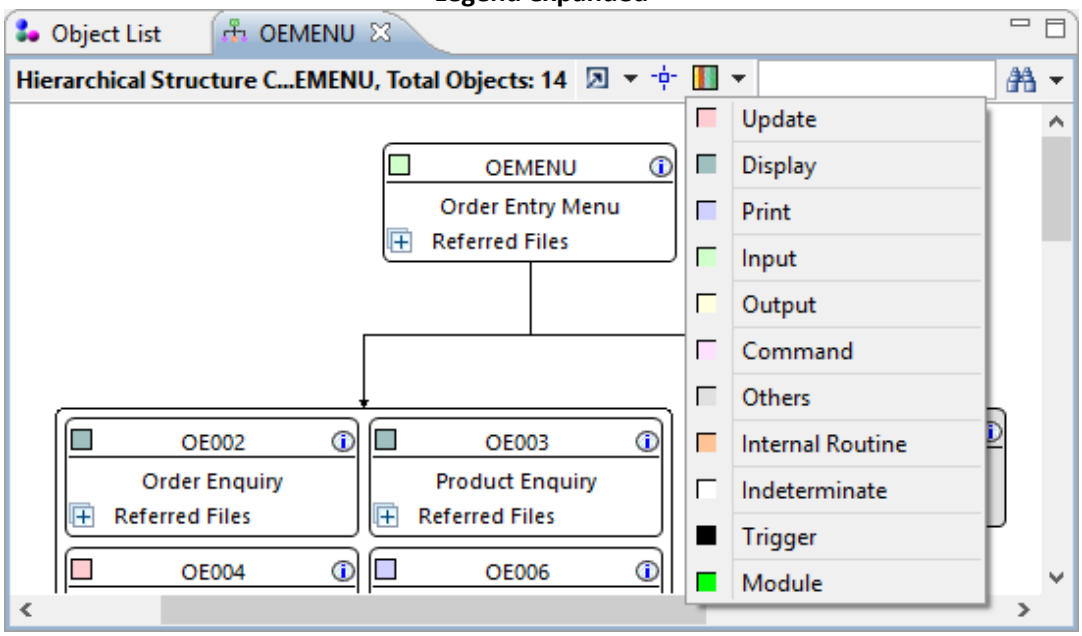
Legend expanded



The description of the HSC Legend is as follows:

- **Update** – This depicts the program that updates a file.
- **Display** – This depicts the program that uses a Display file.
- **Print** – This depicts the program that uses a Print file.
- **Input** – This depicts the program that uses an Input file.
- **Output** – This depicts the program that writes to a file.
- **Command** – This simply depicts a Command.
- **Others** – This refers to the Programs where they are referring to a file which is not Update/Display/Print/Input/Output.
- **Internal Routine** – This refers to the Synon-specific routines.
- **Indeterminate** – This depicts the programs where the usage cannot be programmatically determined.
- **Trigger** – This depicts the program which is a Trigger.
- **Module** – This depicts the program which is a Module.

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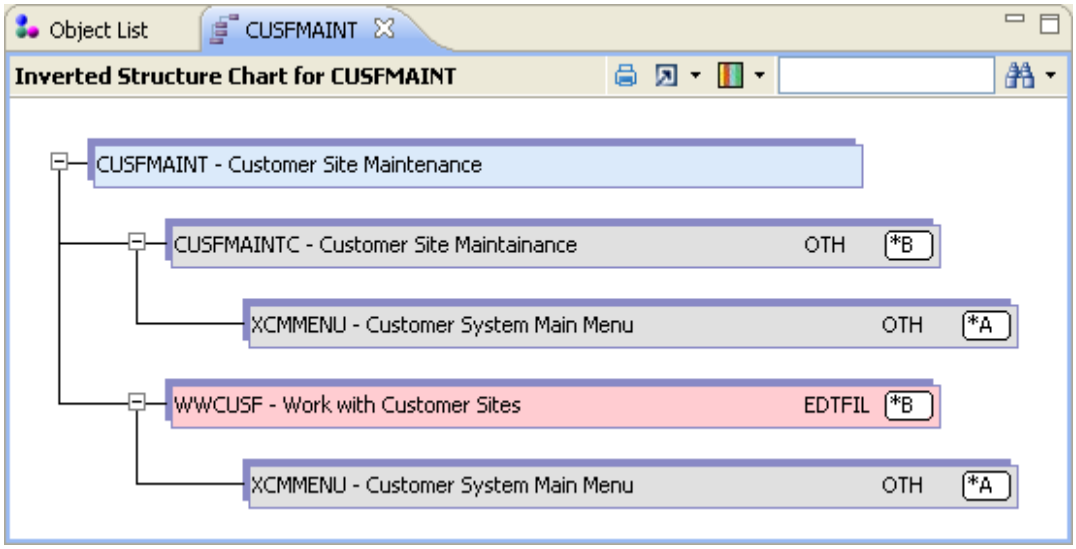
INVERTED STRUCTURE CHART

The Inverted Structure Chart depicts the reverse order of the calling programs. In other words, it traces the backward movement of how a specific program gets called. It shows the immediate calling programs that may be the same for the other programs called. In the screenshot below, **XCMMENU** program is calling for both **WWCUSF** and **CUSFMAINTC** along with the main called program, **CUSFMAINT**.

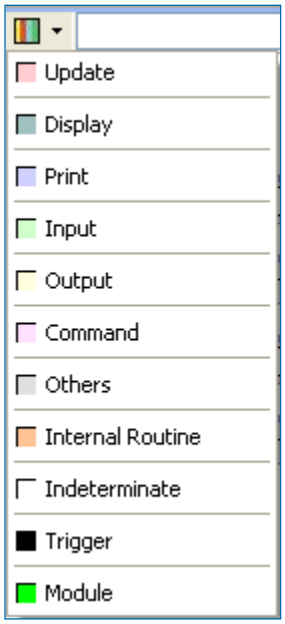
Inverted Structure Chart


Object List
CUSFMAINT
Inverted Structure Chart for CUSFMAINT
CUSFMAINT - Customer Site Maintenance
CUSFMAINTC - Customer Site Maintainance OTH *B
XCMMENU - Customer System Main Menu OTH *A
WWCUSF - Work with Customer Sites EDTFIL *B
XCMMENU - Customer System Main Menu OTH *A

Legend

The image and the description of the **Inverted Structure Chart Legend** are as follows:

- **Update** – This depicts the program that updates a file.
- **Display** – This depicts the program that uses a Display file.
- **Print** – This depicts the program that uses a Print file.
- **Input** – This depicts the program that uses an Input file.
- **Output** – This depicts the program that writes to a file.
- **Command** – This simply depicts a Command.
- **Others** – This refers to the Programs where they are referring to a file which is not Update/Display/Print/Input/Output.
- **Internal Routine** – This refers to the Synon-specific routines.



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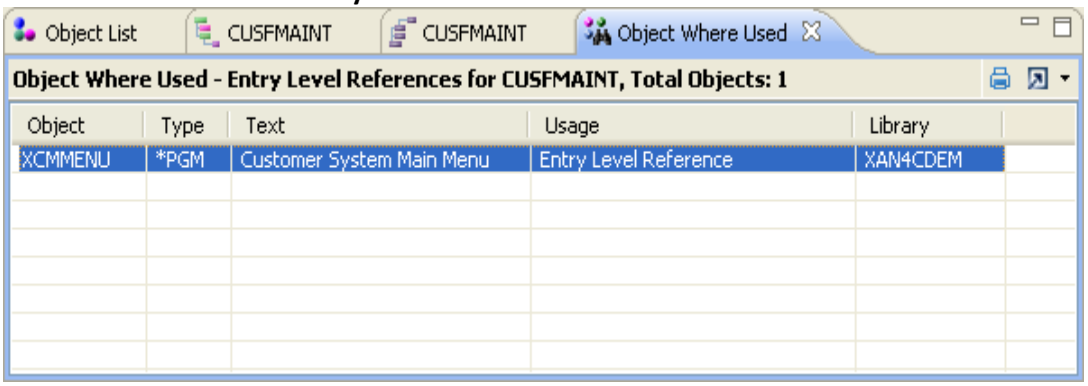
- **Indeterminate** – This depicts the programs where the usage cannot be programmatically determined.
- **Trigger** – This depicts the program which is a Trigger.
- **Module** – This depicts the program which is a Module.

The Inverted Structure Chart can also be viewed as the diagrammatic representation of **Object Where Used > Entry Level References** for a particular program. The references appear as a list in tabular form that gives the lead of the calling object. In this case it is **XCMMENU**, as shown in the screenshot below:

Entry Level References List – XCMMENU



PROGRAM STRUCTURE CHART/PSC

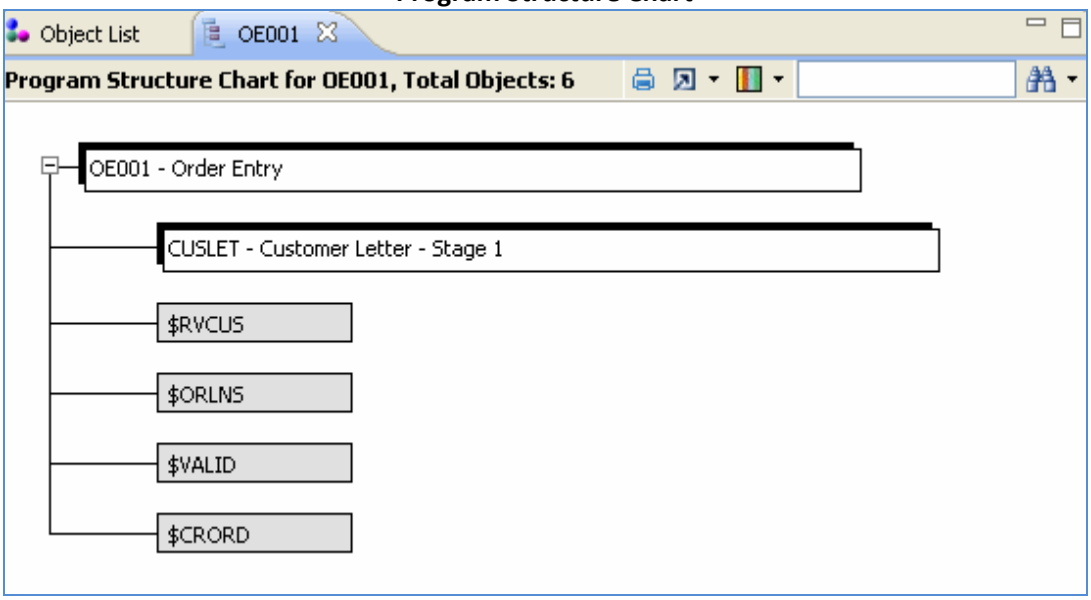
The Program Structure Chart graphically displays the sequence of calls in the program. The call operation can perform the following:

- Execute a Subroutine
- Execute a Sub-Procedure
- Execute a Program/Module/Service Program.

The subroutines are displayed as small rectangles with grey background, displaying name of the subroutine. The object's Function Type determines the coloring of all other boxes viz. Programs, Modules, and Service Programs.

Boxes other than the subroutine boxes, are of the size of program element as on the Structure Chart.

Program Structure Chart

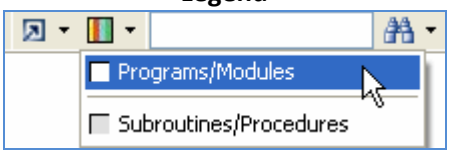


The menu options and context menu options on the PSC work the same way as on the SCD, except for the **Zoom Source** option.

If there is no Main Procedure and only sub-procedures exist, then the PSC displays each sub-procedure's PSC independently, one after the other. If no sub-procedures exist then the PSC only displays the program.

Legend

Legend



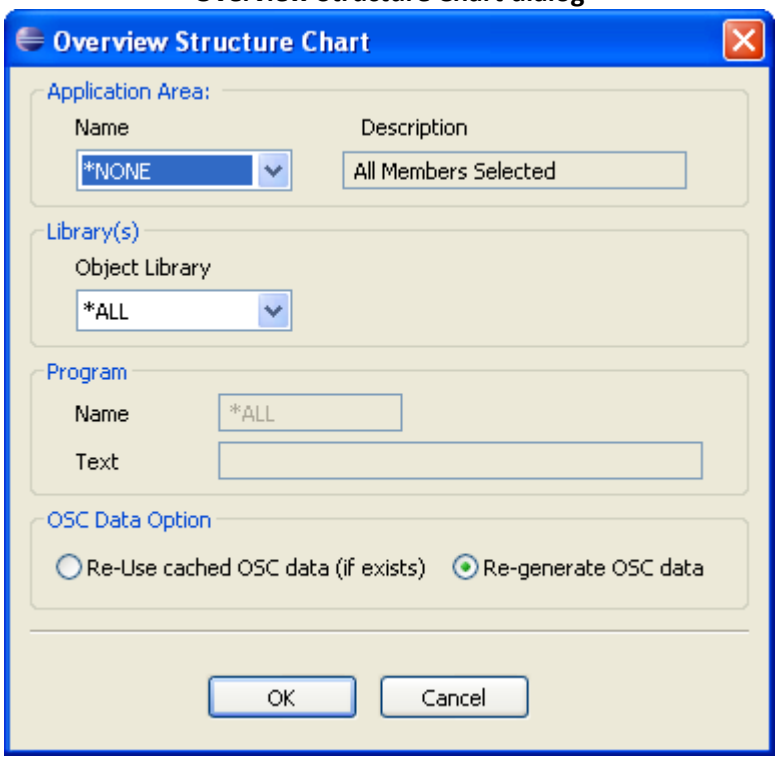
There are two colors in the PSC Legend. White depicts the calling Programs or Modules. Gray depicts the calling Subroutines or Procedures.

OVERVIEW STRUCTURE CHART/OSC

The OSC gives a snapshot of an application displaying all entry points to the application. The details of all the mainline entry-level programs are displayed, which give an idea of the modules and sub-modules present in an application.

The **Overview Structure Chart** node is available under the cross-reference library node and application area(s) node. Double-click the **Overview Structure Chart** node to display the following dialog.

Overview Structure Chart dialog



The **Overview Structure Chart** dialog prompts you to:

1. Select the Application Area name, if available, else leave it as *NONE.
2. Pick the Object Library from the drop-down list.
3. The Program Name will be set as *ALL.
4. Select **OSC Data Option** to re-use cached data or re-generate data.

Click **OK** to display the Objects' OSC based on the selection criterion.

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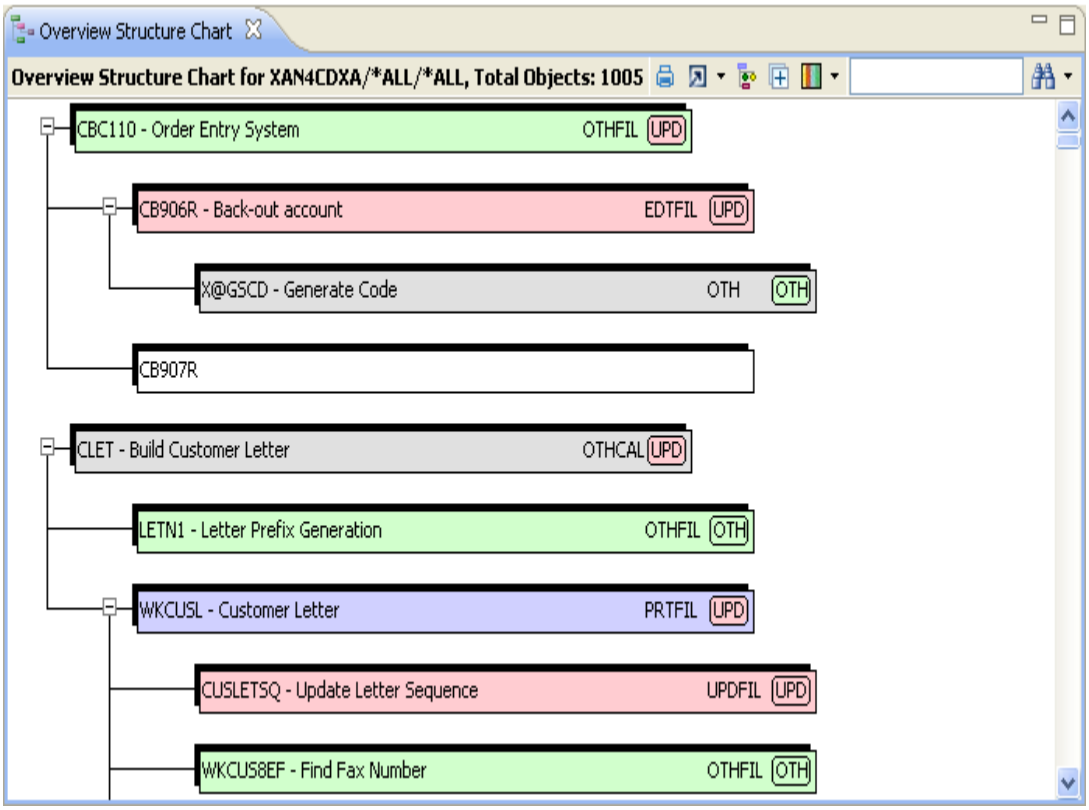
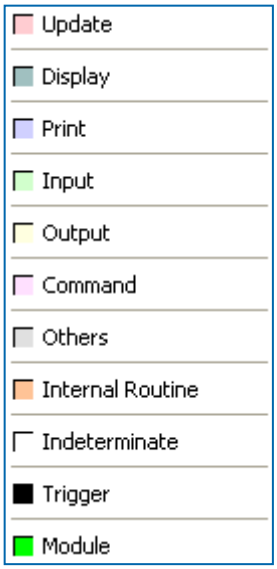
Overview Structure Chart window


Overview Structure Chart
Overview Structure Chart for XAN4CDXA/*ALL/*ALL, Total Objects: 1005
CBC110 - Order Entry System OTHFIL UPD
CB906R - Back-out account EDTFIL UPD
X@GSCD - Generate Code OTH OTH
CB907R
CLET - Build Customer Letter OTHCAL UPD
LETN1 - Letter Prefix Generation OTHFIL OTH
WKCUSL - Customer Letter PRTFIL UPD
CUSLETSQ - Update Letter Sequence UPDFIL UPD
WKCUS8EF - Find Fax Number OTHFIL OTH

Legend

The description of the OSC Legend is as follows:

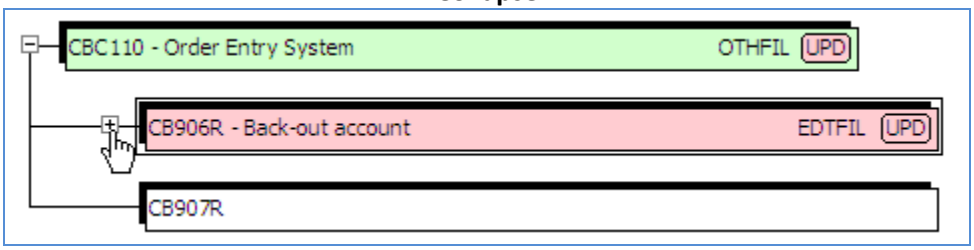


- **Update** – This depicts the program that updates a file.
- **Display** – This depicts the program that uses a Display file.
- **Print** – This depicts the program that uses a Print file.
- **Input** – This depicts the program that uses an Input file.
- **Output** – This depicts the program that writes to a file.
- **Command** – This simply depicts a Command.
- **Others** – This refers to the Programs that are referring to a file which is not Update/Display/Print/Input/Output.
- **Internal Routine** – This refers to the Synon-specific routines.
- **Indeterminate** – This depicts the programs where the usage cannot be programmatically determined.

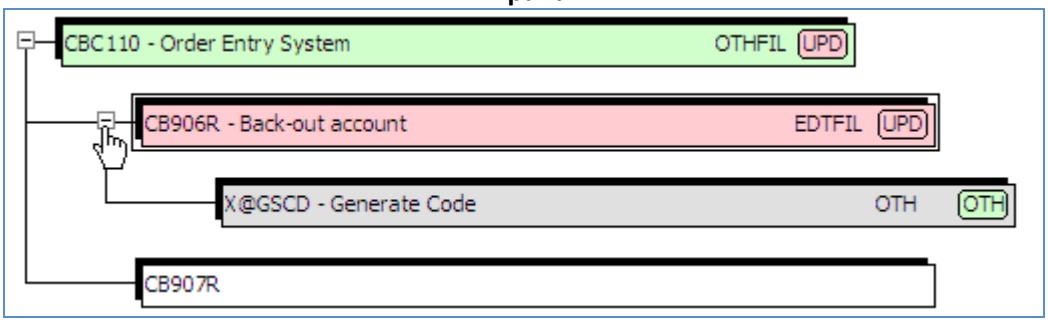
- **Trigger** – This depicts the program which is a Trigger.
- **Module** – This depicts the program which is a Module.

The OSC can be expanded/collapsed using the button on the lines.

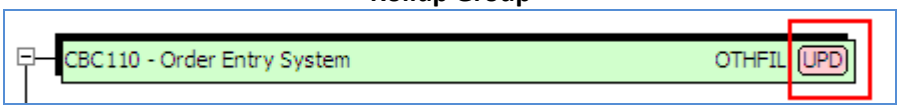
Collapse



Expand



Rollup Group



The Rollup group describes the cumulative component function of the program and its dependents.

The following types of Rollup groups are available:

- UPD – At least one program updates a file.
- PRT – Program and dependent programs create a printed report.
- DSP – Program and dependent programs use input files and display files.
- OTH – No cumulative component function can be determined.

Function Type

Function Type describes the function of the object and is based on COOL: 2E definitions.

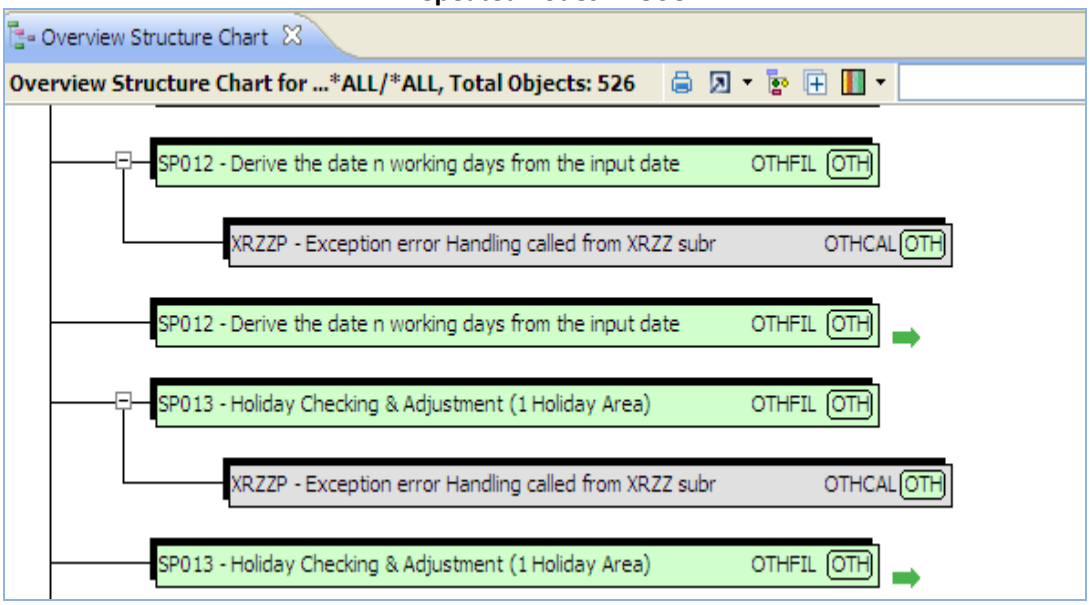
Hierarchy Exclusions in OSC

Work with Exclusions is an option on the master command menu **X4WRKAPP** (**Option 16**). Using this feature you can add a program's name for Hierarchy Exclusions. This has effect in the OSC and the SCD. This feature removes the child nodes of the excluded object and a green arrow is shown to indicate the hierarchy exclusion.

Repeated Nodes in OSC

The OSC displays the repeated objects (having child nodes) with a green arrow beside them. The following screen displays repeated nodes in OSC.

Repeated nodes in OSC


Overview Structure Chart
Overview Structure Chart for ...*ALL/*ALL, Total Objects: 526
SP012 - Derive the date n working days from the input date OTHFIL OTH
XRZZP - Exception error Handling called from XRZZ subr OTHCAL OTH
SP012 - Derive the date n working days from the input date OTHFIL OTH
SP013 - Holiday Checking & Adjustment (1 Holiday Area) OTHFIL OTH
XRZZP - Exception error Handling called from XRZZ subr OTHCAL OTH
SP013 - Holiday Checking & Adjustment (1 Holiday Area) OTHFIL OTH

Detailed OSC

Click on the **Show Narratives** icon to invoke the Detailed Overview Structure Chart.. It is available on the toolbar associated with the OSC.

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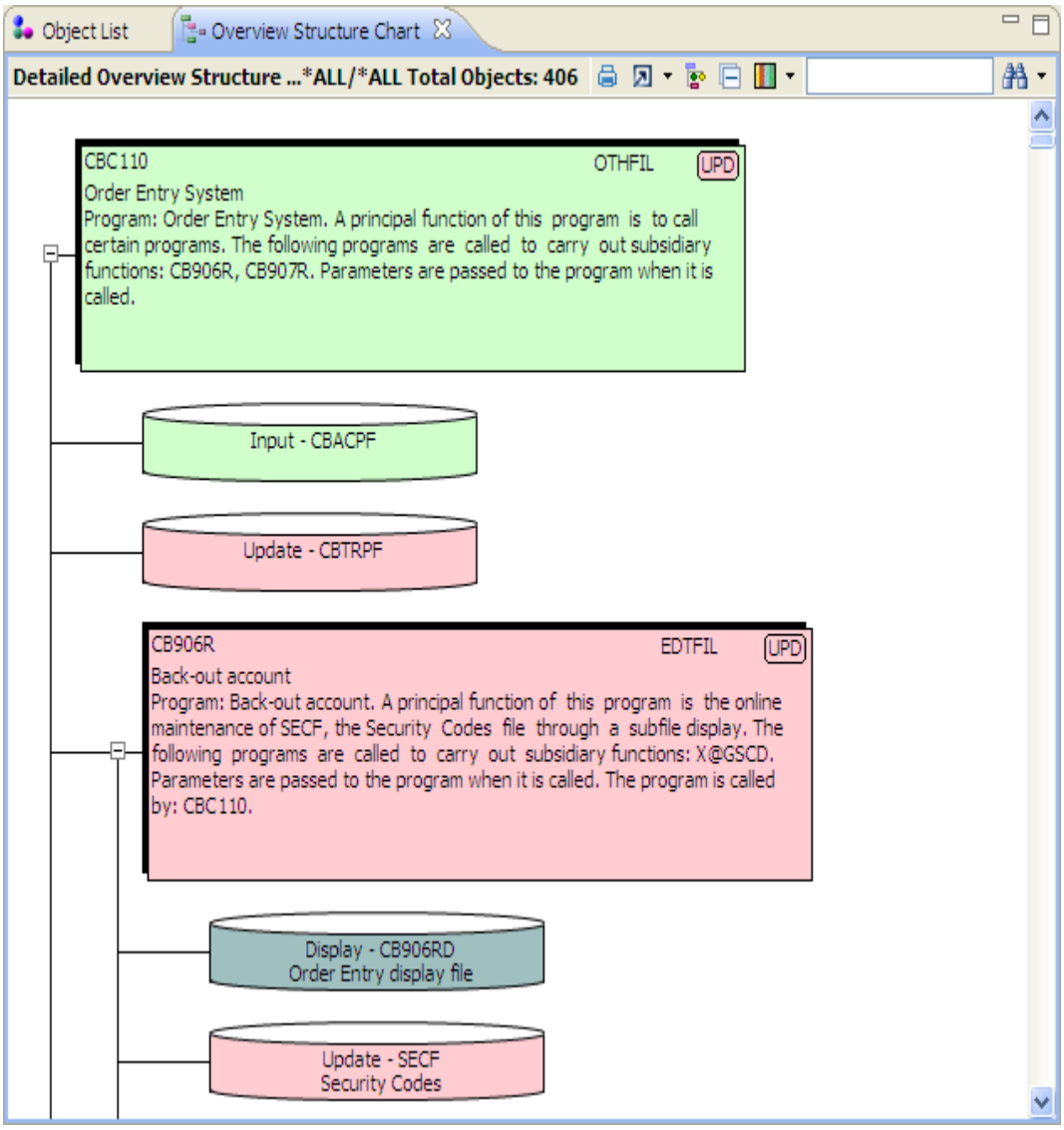
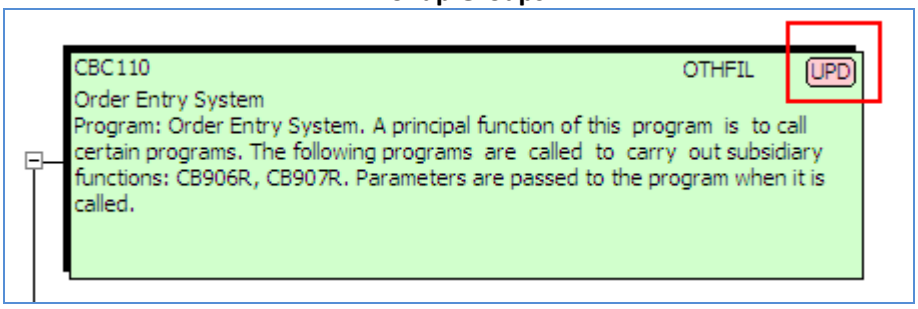
Detailed OSC


Object List
Overview Structure Chart
Detailed Overview Structure ...*ALL/*ALL Total Objects: 406
CBC110
OTHFIL
UPD
Order Entry System
Program: Order Entry System. A principal function of this program is to call certain programs. The following programs are called to carry out subsidiary functions: CB906R, CB907R. Parameters are passed to the program when it is called.
Input - CBACPF
Update - CBTRPF
CB906R
EDTFIL
UPD
Back-out account
Program: Back-out account. A principal function of this program is the online maintenance of SECF, the Security Codes file through a subfile display. The following programs are called to carry out subsidiary functions: X@GSCD. Parameters are passed to the program when it is called. The program is called by: CBC110.
Display - CB906RD
Order Entry display file
Update - SECF
Security Codes

Rollup Groups


CBC110
OTHFIL
UPD
Order Entry System
Program: Order Entry System. A principal function of this program is to call certain programs. The following programs are called to carry out subsidiary functions: CB906R, CB907R. Parameters are passed to the program when it is called.

The Rollup group describes the cumulative component function of the program and its dependents.

The following types of Rollup groups are available:

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- UPD – At least one program updates a file
- PRT – Program and dependent programs create a printed report
- DSP – Program and dependent programs use input files and display files
- OTH – No cumulative component function can be determined.

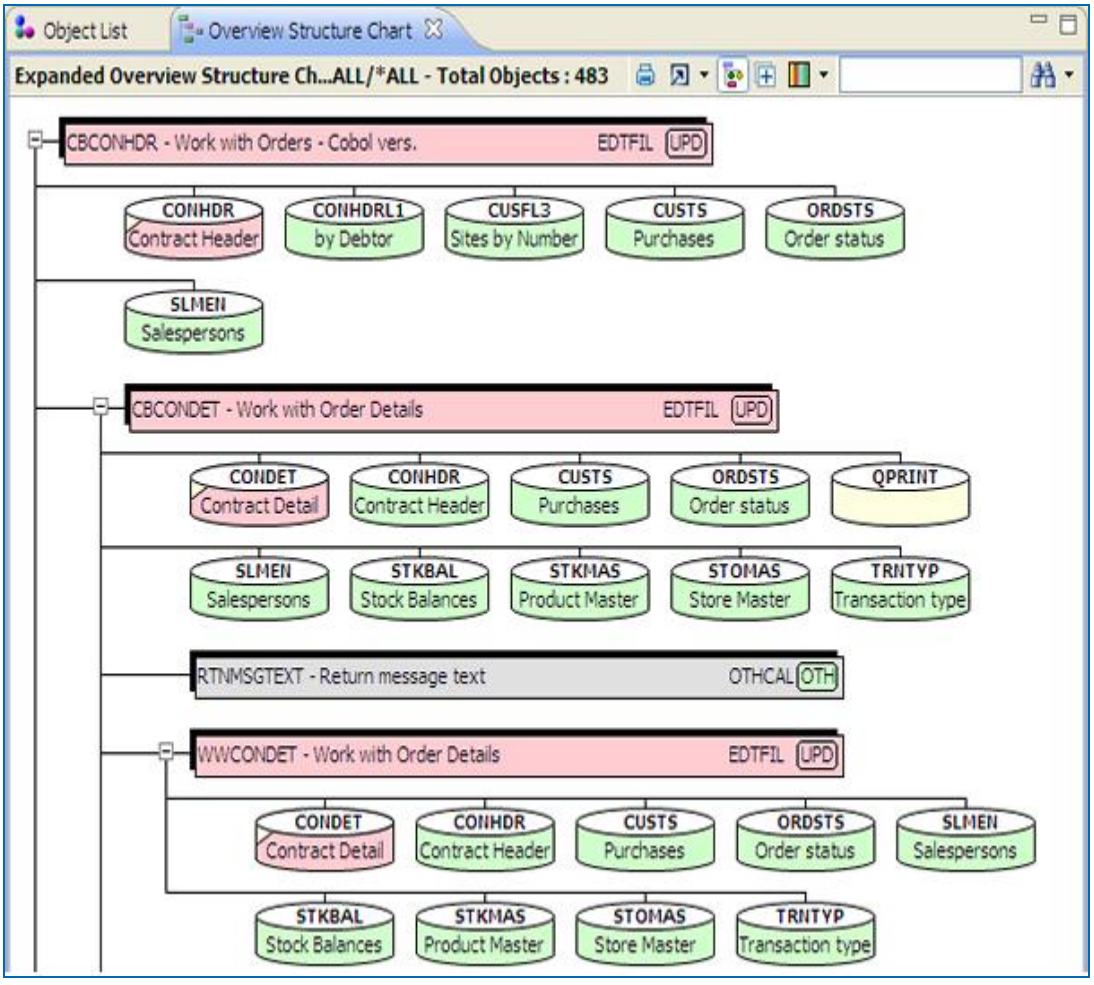
Function Type

Function Type describes the function of the object and is based on COOL: 2E definitions.

OSC with Files

The Normal Overview Structure Chart displays a snapshot of an application using programs only. Click the **Show Files** icon available on the OSC toolbar to display the available files along with the programs.

Overview Structure Chart with I/O Files



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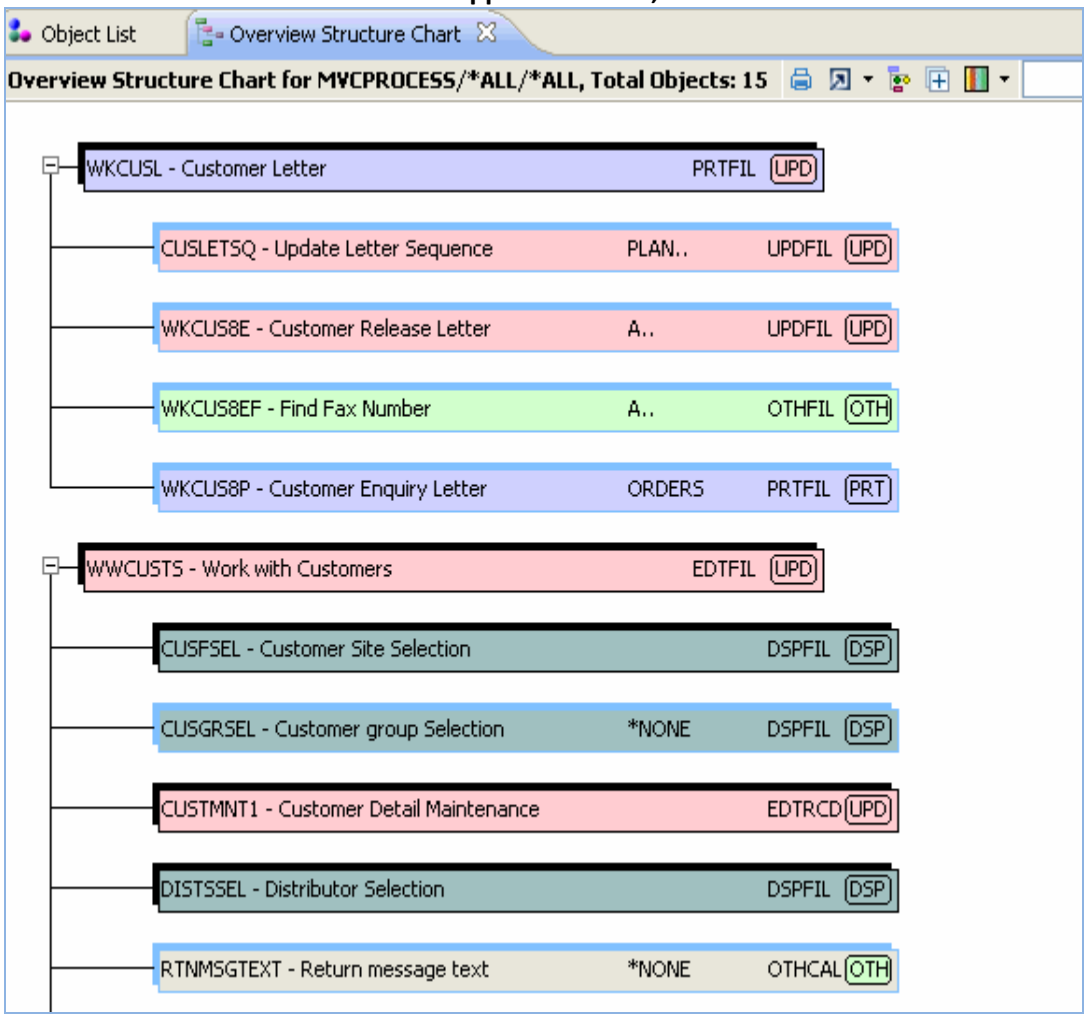
Application Area OSC

When you select the **OSC** option on an application area (Application Area node should be selected), then objects not belonging to the selected application area are highlighted in blue. The names of application areas are displayed on the tool tip of those objects not belonging to the selected application area.

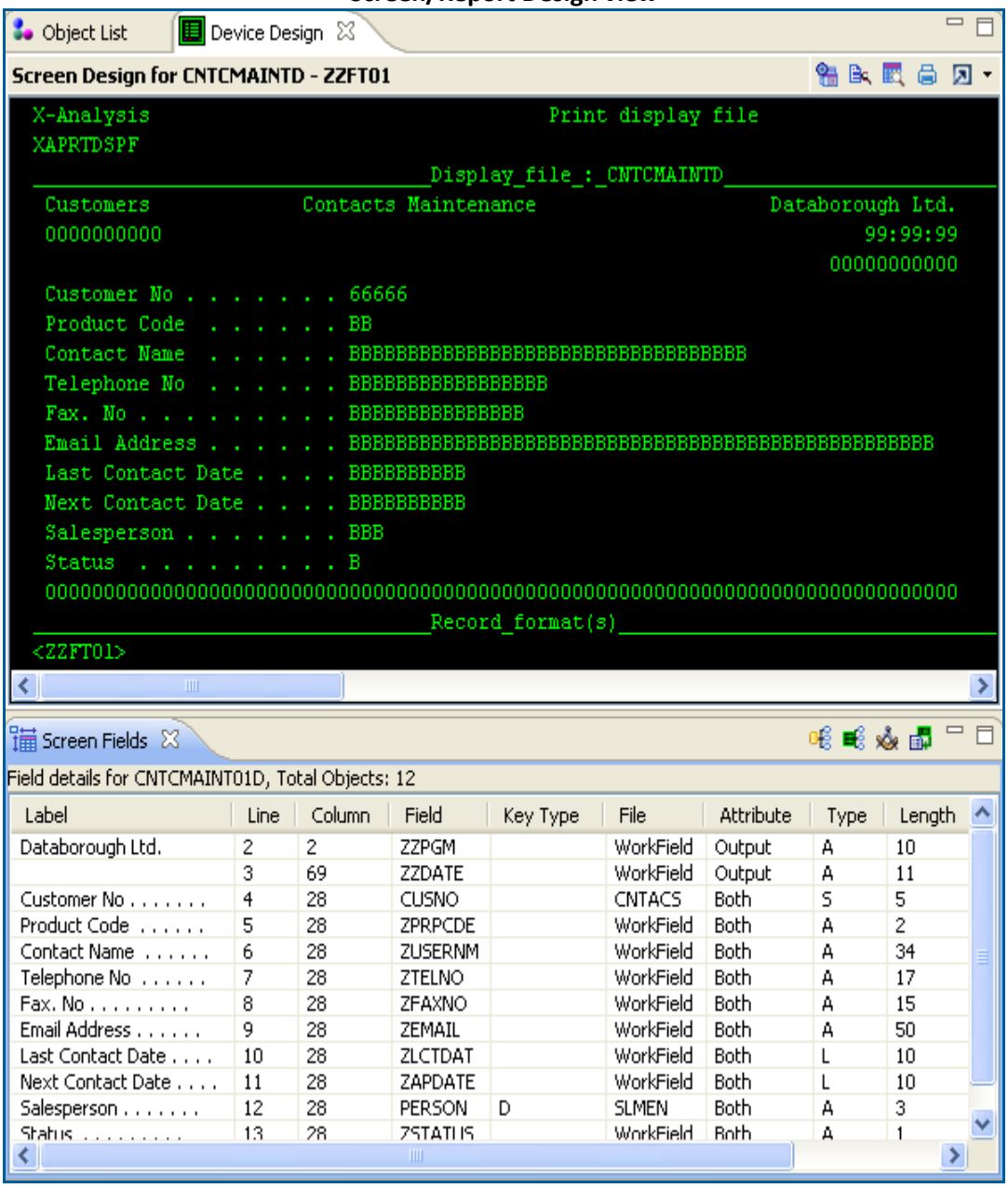
OSC on selected application area, MVCPROCESS


Object List
Overview Structure Chart
Overview Structure Chart for MVCPROCESS/*ALL/*ALL, Total Objects: 15
WKCUSL - Customer Letter PRTFIL UPD
CUSLETSQ - Update Letter Sequence PLAN.. UPDFIL UPD
WKCUS8E - Customer Release Letter A.. UPDFIL UPD
WKCUS8EF - Find Fax Number A.. OTHFIL OTH
WKCUS8P - Customer Enquiry Letter ORDERS PRTFIL PRT
WWCUSTS - Work with Customers EDTFIL UPD
CUSFSEL - Customer Site Selection DSPFIL DSP
CUSGRSEL - Customer group Selection *NONE DSPFIL DSP
CUSTMNT1 - Customer Detail Maintenance EDTRCD UPD
DISTSSEL - Distributor Selection DSPFIL DSP
RTNMSGTEXT - Return message text *NONE OTHCAL OTH

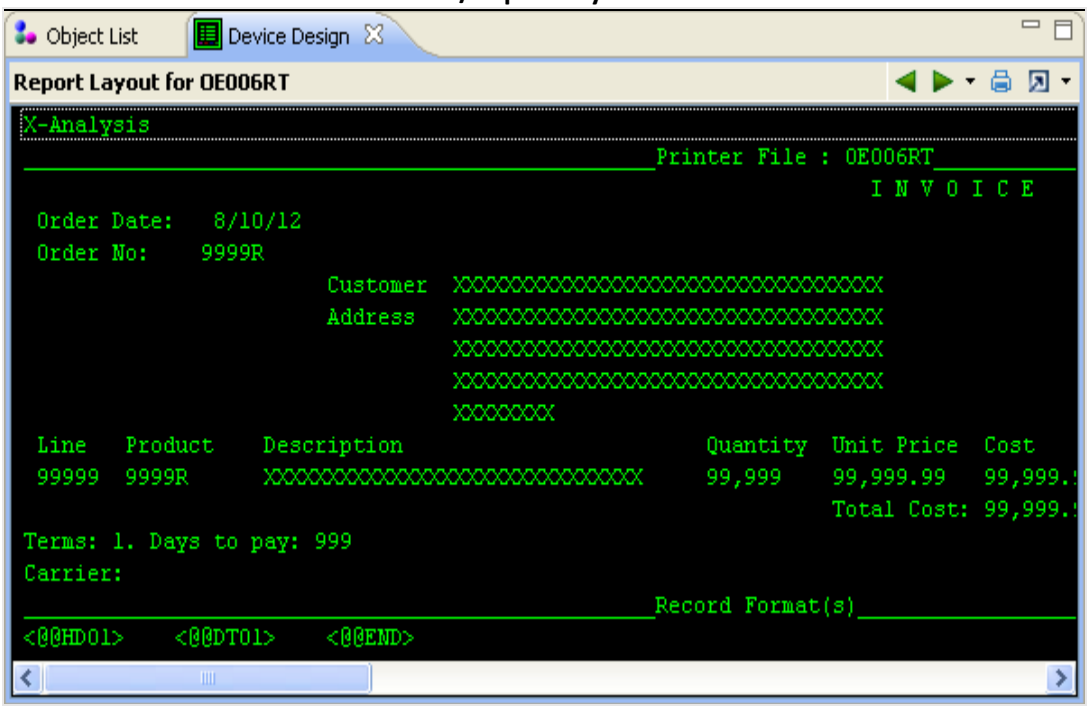
SCREEN/REPORT DESIGN

The **Screen/Report Design** option works on Display and Printer Files. It displays the actual layout for the Display/Printer file. This option also works on program objects (RPG, RPGLE and MENU) and displays the layout of the associated Display/Printer files.

Screen/Report Design view


Object List
Device Design
Screen Design for CNTCMAINTD - ZZFT01
X-Analysis
Print display file
XAPRTDSPF
Display_file_:_CNTCMAINTD
Customers
Contacts Maintenance
Databorough Ltd.
0000000000
99:99:99
00000000000
Customer No 66666
Product Code . . . . . BB
Contact Name . . . . . BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
Telephone No . . . . . BBBBBBBBBBBBBBBB
Fax. No . . . . . BBBBBBBBBBBBBBB
Email Address . . . . . BBBBBBBBBBBBBBBBBBBB

Screen/Report Layout view



If you select the **Screen/Report Design** option while documenting, then the current Screen Design will be printed with the Field Details. An option for detailed documentation of Screen Design has been provided in the System Documenter Wizard.. Select the **Detailed** option to also print the DCD, ACD, and header information for each screen

SCREEN FLOW DIAGRAM

The Screen Flow Diagram is an extended form of Activity Diagram for RSA/RSM. It displays the screens' flow for a program. This diagram is available on RPGLE/RPG. There are four types of screens:

- Subfile (Screen with a dependent grid)
- Update capable screen
- Display only screen
- Repeated node

Select **WWCONHDR** from the Object List of the tutorial application. Opt for the context menu on it, and then select the **Screen Flow Diagram** option. The following image displays the Screen Flow Diagram for **WWCONHDR**.

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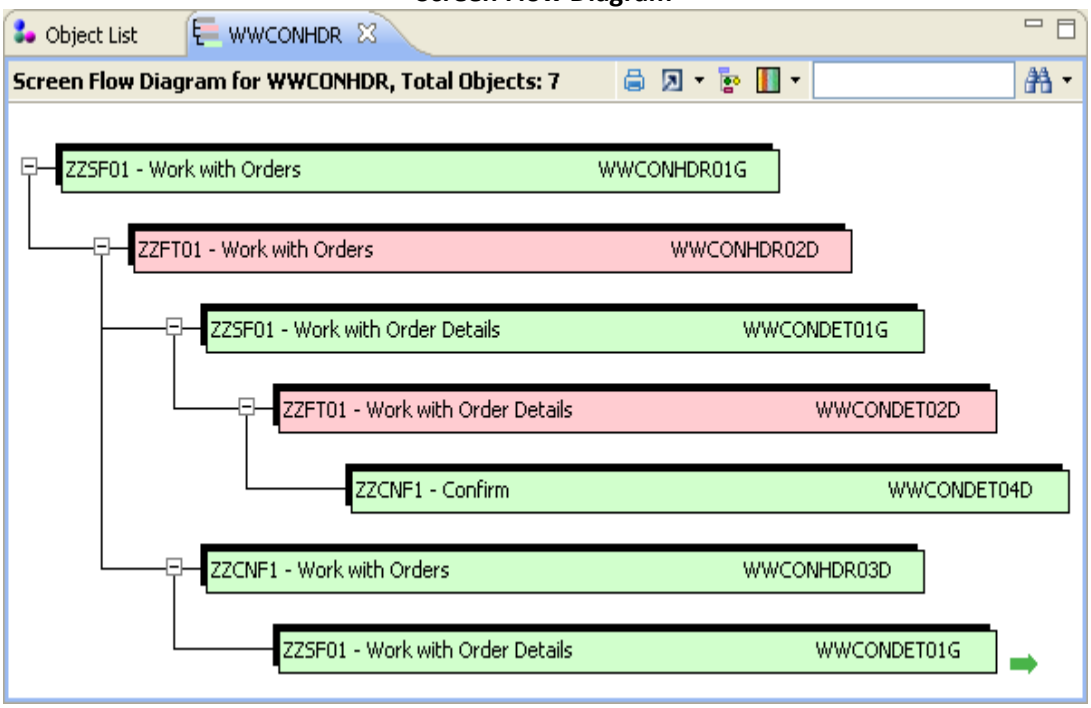
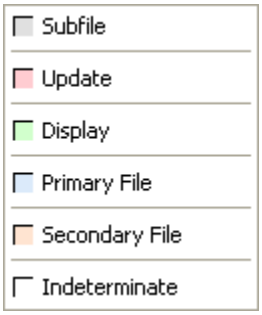
Screen Flow Diagram


Object List
WWCONHDR
Screen Flow Diagram for WWCONHDR, Total Objects: 7
ZZSF01 - Work with Orders WWCONHDR01G
ZZFT01 - Work with Orders WWCONHDR02D
ZZSF01 - Work with Order Details WWCONDET01G
ZZFT01 - Work with Order Details WWCONDET02D
ZZCNF1 - Confirm WWCONDET04D
ZZCNF1 - Work with Orders WWCONHDR03D
ZZSF01 - Work with Order Details WWCONDET01G

Legend

The Screen Flow Diagram **Legend** illustrates the type of object displayed.



- **Subfile** – This refers to the object using a Subfile.
- **Update** – This refers to the object updating a file.
- **Display** – This refers to the object using a Display file.
- **Primary File** – This refers to the PF used by the object.
- **Secondary File** – This refers to the Secondary File used by the object.
- **Indeterminate** – This refers to the objects where the usage cannot be programmatically determined.

Repeated Nodes in Screen Flow Diagram

The Screen Flow Diagram displays the repeated nodes in their original color. Also, an arrow of the same color is displayed for the repeated nodes (having child nodes). The following image displays repeated nodes in Screen Flow Diagram.

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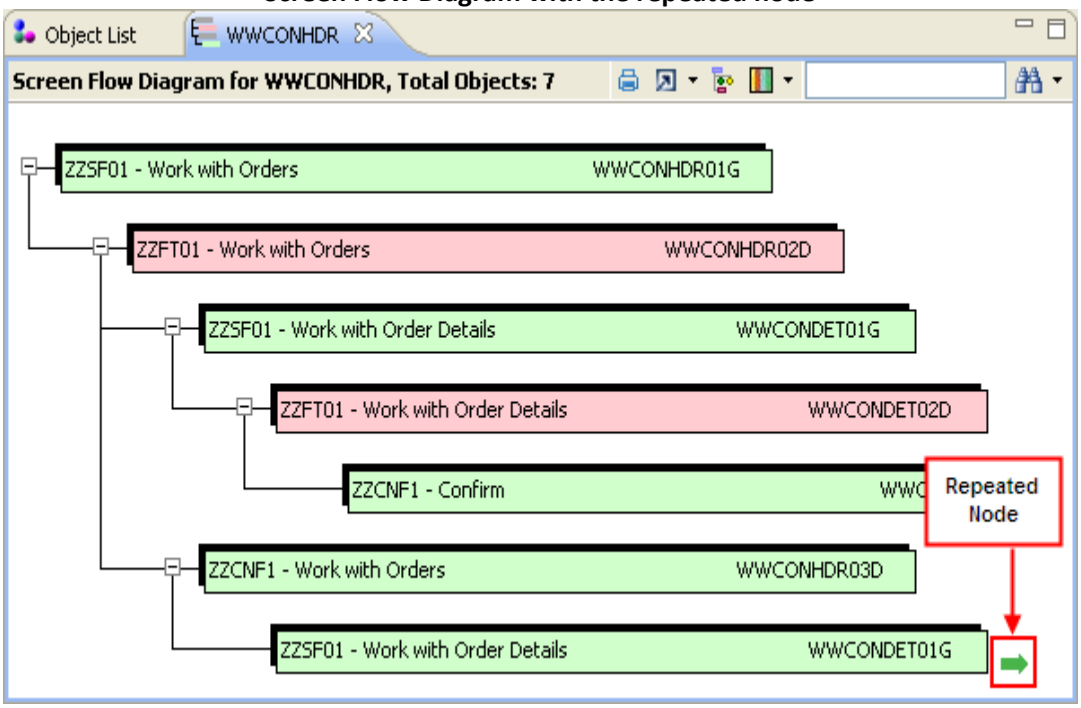
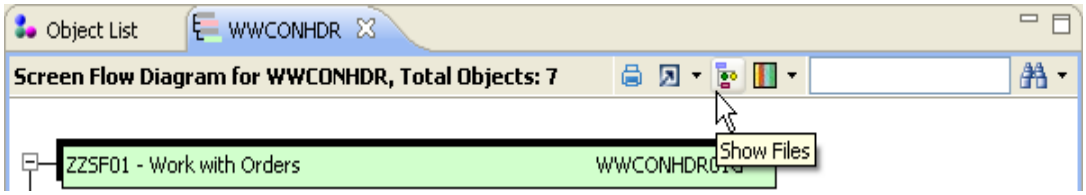
Screen Flow Diagram with the repeated node


Object List
WWCONHDR
Screen Flow Diagram for WWCONHDR, Total Objects: 7
ZZSF01 - Work with Orders WWCONHDR01G
ZZFT01 - Work with Orders WWCONHDR02D
ZZSF01 - Work with Order Details WWCONDET01G
ZZFT01 - Work with Order Details WWCONDET02D
ZZCNF1 - Confirm
Repeated Node
ZZCNF1 - Work with Orders WWCONHDR03D
ZZSF01 - Work with Order Details WWCONDET01G

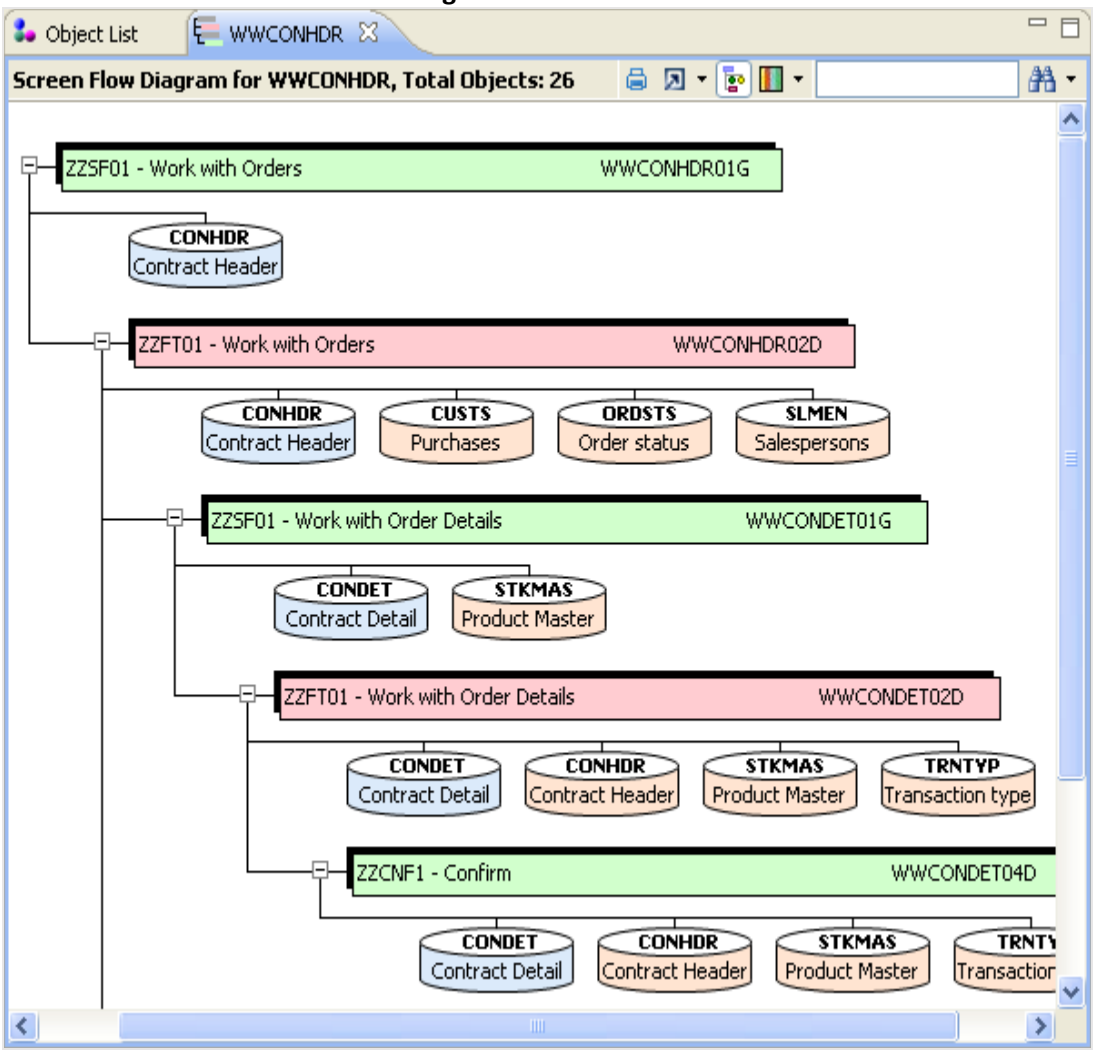
The **Show Files** icon is provided to show the files used by the function.

Show Files icon



When you click on the icon, all the files related to the selected object are displayed, as shown below.

Screen Flow Diagram for WWCONHDR with Files



ACCESS PATH DIAGRAM

The Access Path Diagram is the diagrammatic representation of LFs/Access Paths lists. The LFs/Access Paths displays all the access paths for a selected physical file.

Opt for the context menu on that PF to generate the Access Path Diagram for a PF, and then select the **Access Path Diagram** option.

The following diagram displays the Access Path Diagram for **CUSF**.

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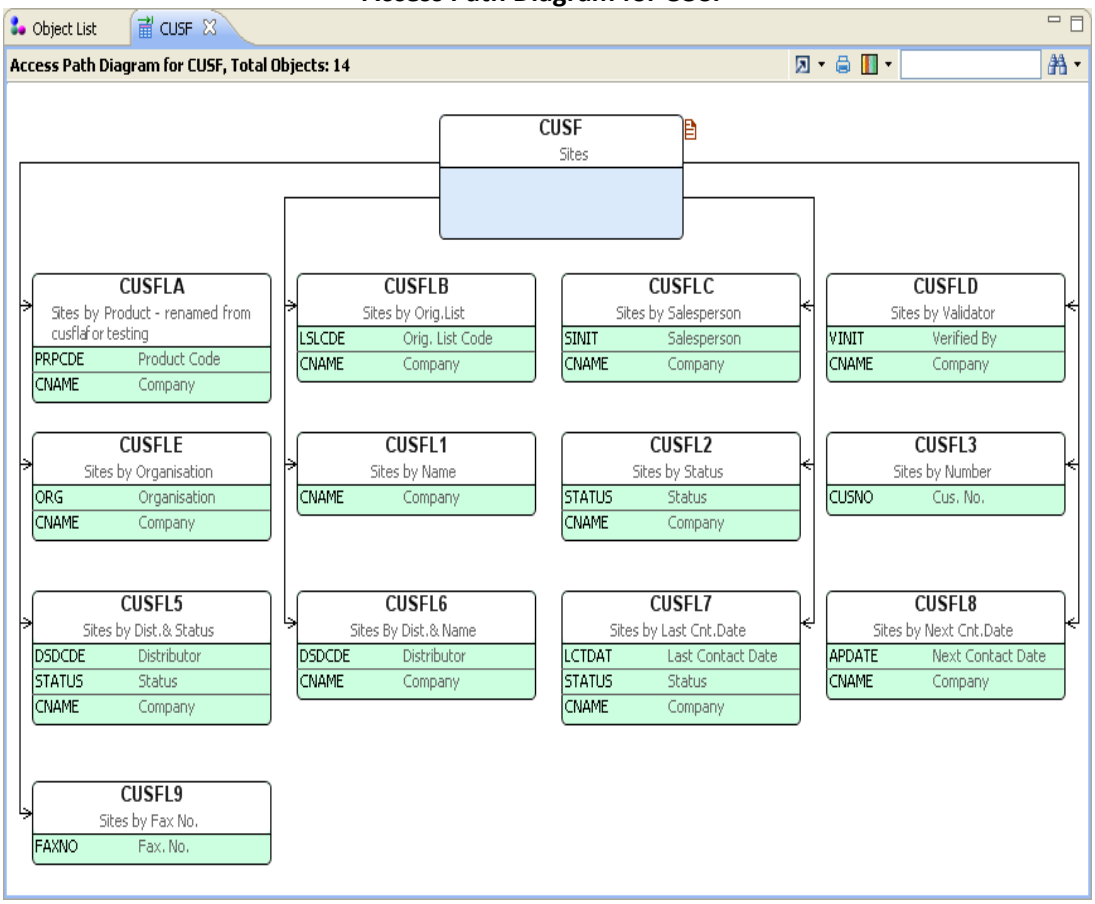
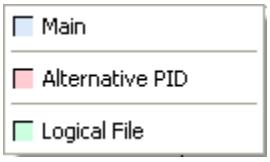
Access Path Diagram for CUSF



Legend

The Access Path Diagram **Legend** displays the following:

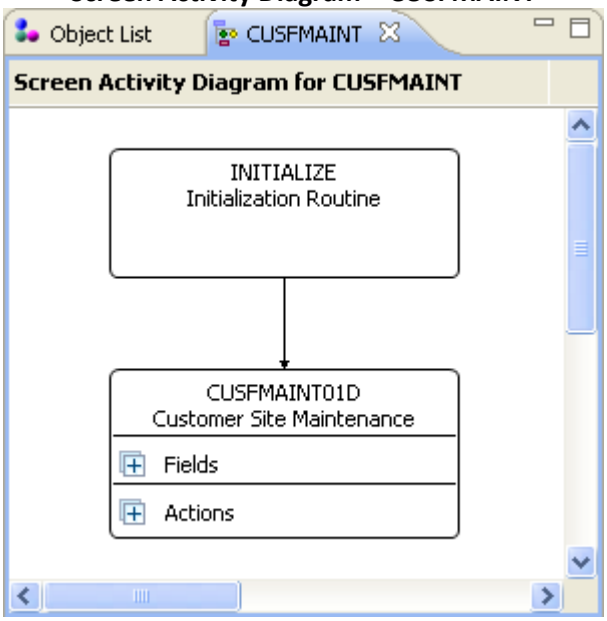


- **Main** – This depicts the main object.
- **Alternative PID** – This depicts the alternative Primary Identifier file.
- **Logical File** – This depicts the LF for the selected object.

SCREEN ACTIVITY DIAGRAM

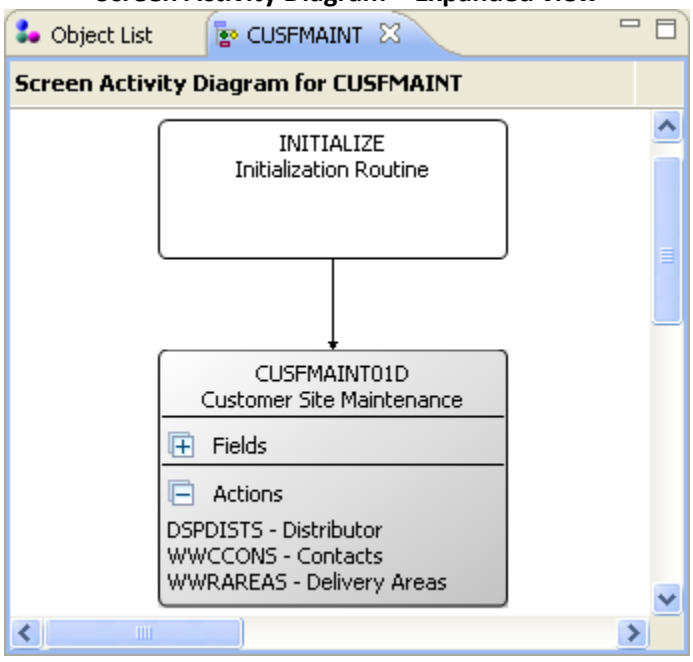
The **Screen Activity Diagram** option is available on the context menu of an object. Select this option to study the screen(s) activity of a particular object. Bus-routing block diagrams are used to map the activity of the object. When you select this option, the following diagram appears:

Screen Activity Diagram – CUSFMAINT



Click the ⊞ icon to expand the screen and reveal the Fields and the Actions of the object, as displayed underneath:

Screen Activity Diagram – Expanded view



Note: Generating the Screen Activity Diagram is limited to objects with RPG/RPGLE/CBL/CLP/CLLE attribute.

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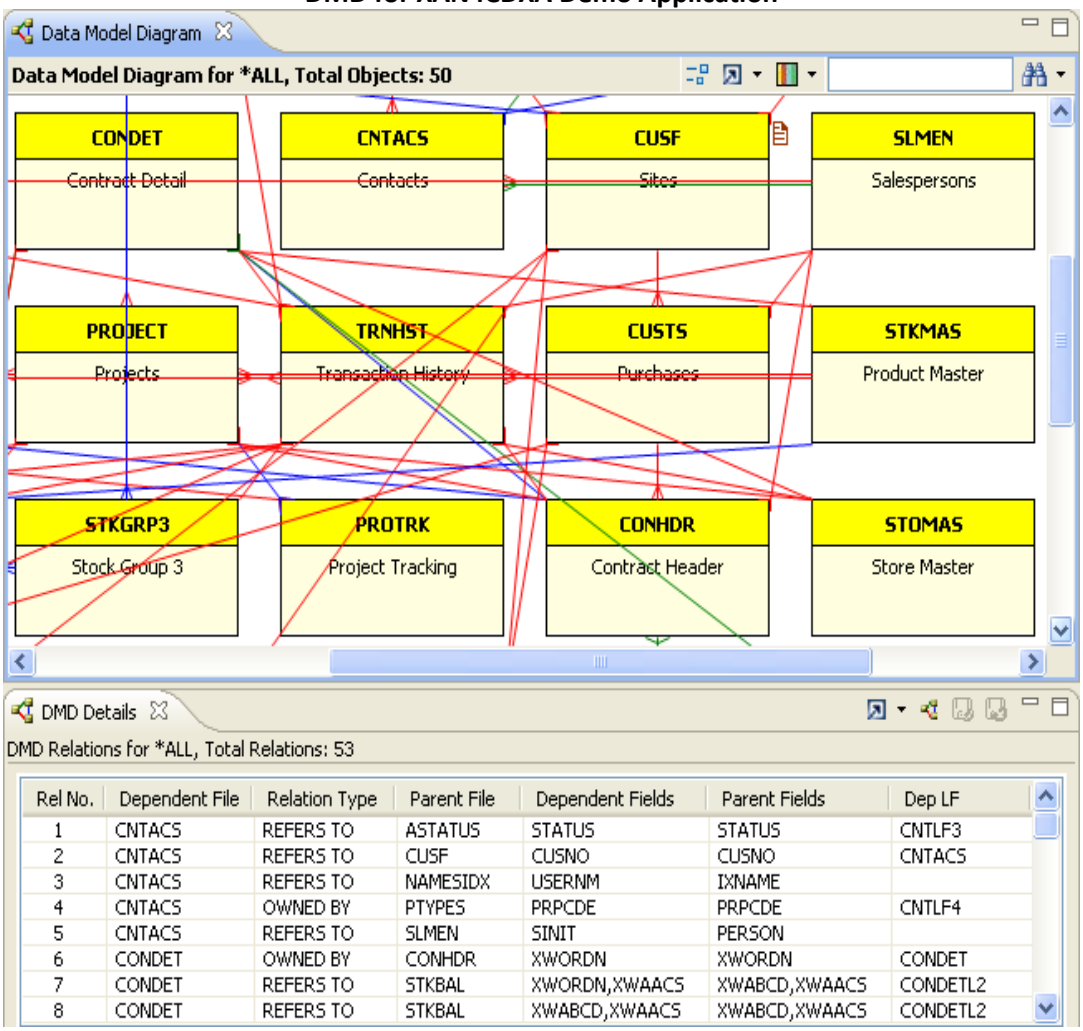
Data Model Diagram

The Data Model Diagram displays file relationships for a File within the cross-reference library or an application area. The related members are displayed distinctly in yellow, while the external Objects (applicable only in the application area) are displayed in blue.

DMD for XAN4CDXA Demo Application



Rel No.	Dependent File	Relation Type	Parent File	Dependent Fields	Parent Fields	Dep LF
1	CNTACS	REFERS TO	ASTATUS	STATUS	STATUS	CNTLF3
2	CNTACS	REFERS TO	CUSF	CUSNO	CUSNO	CNTACS
3	CNTACS	REFERS TO	NAMESIDX	USERNM	IXNAME	
4	CNTACS	OWNED BY	PTYPES	PRPCDE	PRPCDE	CNTLF4
5	CNTACS	REFERS TO	SLMEN	SINIT	PERSON	
6	CONDET	OWNED BY	CONHDR	XWORDN	XWORDN	CONDET
7	CONDET	REFERS TO	STKBAL	XWORDN,XWAACS	XWABCD,XWAACS	CONDETL2
8	CONDET	REFERS TO	STKBAL	XWABCD,XWAACS	XWABCD,XWAACS	CONDETL2

The File Connection details are displayed in the DMD Details view.

Single-click on a specific object shows the references of that object. Click on **CUSTS** to view its references.

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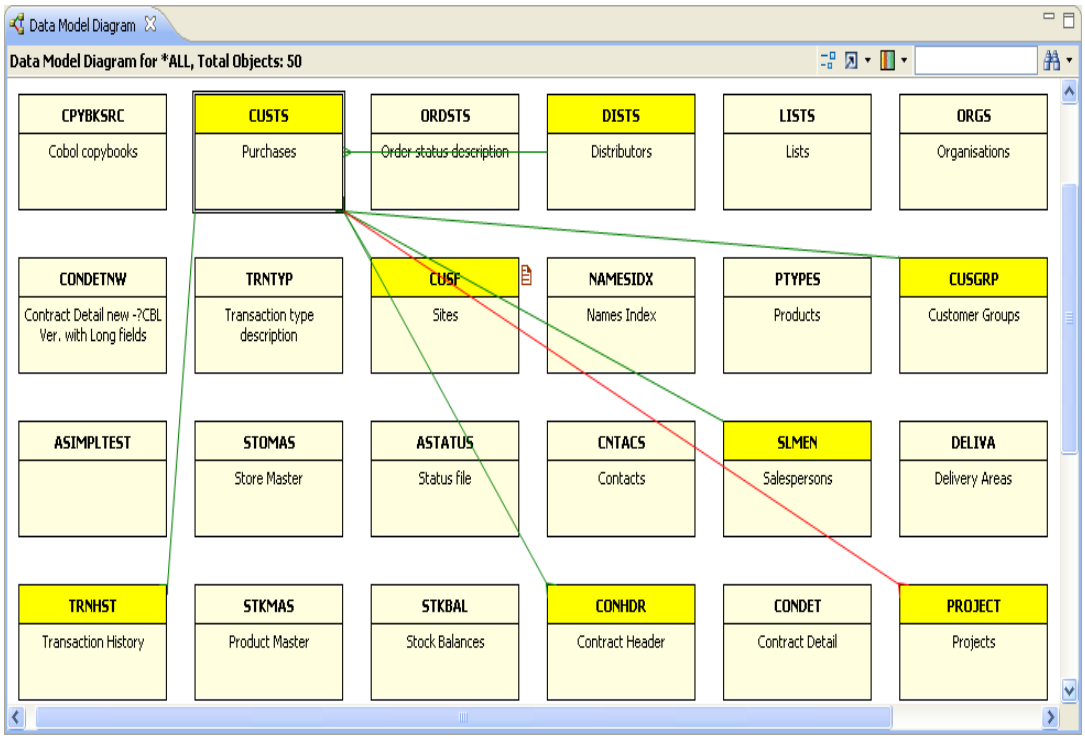
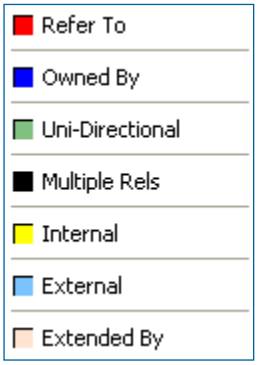
DMD of XAN4CDXA – with CUSTS selected



Legend

The DMD **Legend**, shown alongside, depicts the relationship type of the object(s).

- **Refer To** – This depicts a relationship where a non-key field of another file is referred.
- **Owned By** – This depicts a relationship where the key field of another file is referred.
- **Uni-Directional** – This indicates a singular relationship between two objects.
- **Multiple Rels** – This indicates multiple relationships between two objects.
- **Internal** – This depicts the file internal to an application area.
- **External** – This depicts the file external to an application area.
- **Extended By** – This depicts a special kind of Refers to which is seen in Synon applications.



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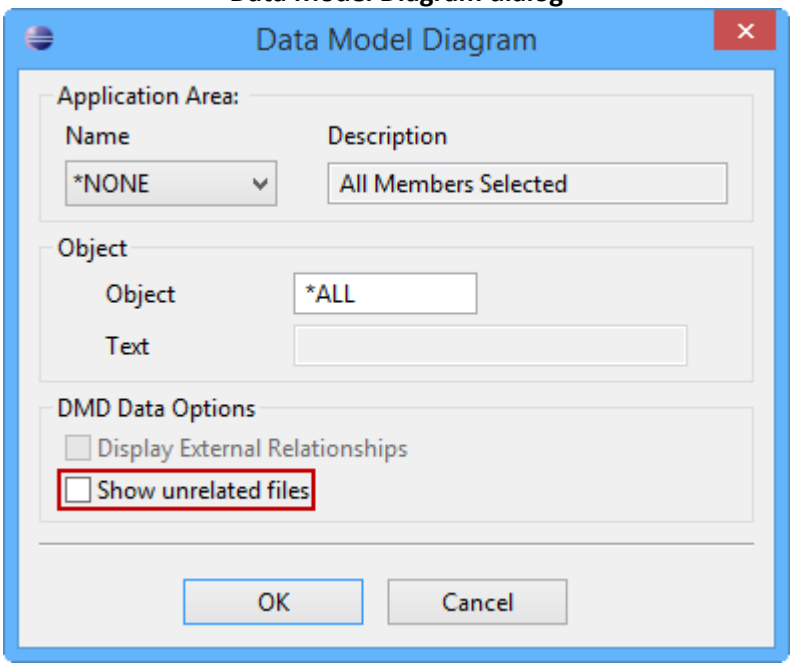
GENERATING DMD

To generate the DMD, expand the Application Library and double-click on the **Data Model Diagram** node. This invokes the **Data Model Diagram** dialog, as shown below.

Data Model Diagram dialog



It prompts the user to:

1. Select the Application Area name, if available; else leave it as *NONE.
2. The Object Name on the Object group can be:
   - *ALL (for all Objects)
   - Object Name (maximum 10 characters long).
3. **DMD Data Options** to Display External Relationships (for Application Area only) and Show unrelated files.
4. Click **OK**.

The Data Model Diagram node is present under the cross-reference library node and the Application Area nodes.

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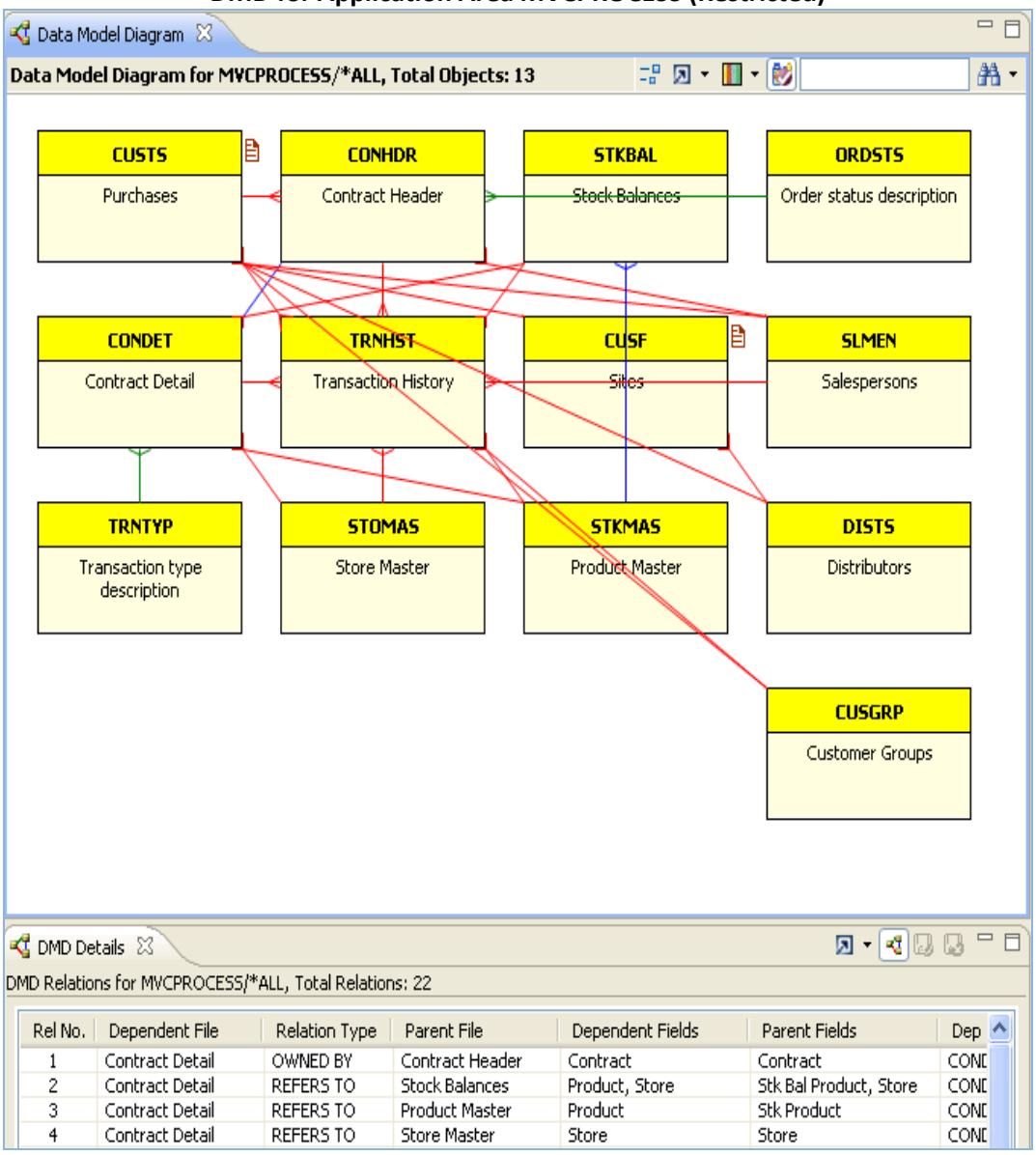
DMD FOR AN APPLICATION AREA

The DMD can also be generated for an application area. It can be opted either by expanding the application area under the cross-reference library node or by selecting the specific application area name on the **Data Model Diagram** dialog.

The DMD for an application area is **restricted** to that application area, representing the relationships among the related objects of the application area.

DMD for Application Area MVCPROCESS (Restricted)


Data Model Diagram
Data Model Diagram for MVCPROCESS/*ALL, Total Objects: 13
CUSTS
Purchases
CONHDR
Contract Header
STKBAL
Stock Balances
ORDSTS
Order status description
CONDET
Contract Detail
TRNHST
Transaction History
CUSF
Sites
SLMEN
Salespersons
TRNTYP
Transaction type description
STOMAS
Store Master
STKMAS
Product Master
DISTS
Distributors
CUSGRP
Customer Groups
DMD Details
DMD Relations for MVCPROCESS/*ALL, Total Relations: 22
Rel No. | Dependent File | Relation Type | Parent File | Dependent Fields | Parent Fields | Dep
1 | Contract Detail | OWNED BY | Contract Header | Contract | Contract | CONT
2 | Contract Detail | REFERS TO | Stock Balances | Product, Store | Stk Bal Product, Store | CONT
3 | Contract Detail | REFERS TO | Product Master | Product | Stk Product | CONT
4 | Contract Detail | REFERS TO | Store Master | Store | Store | CONT

The DMD for an application area can be un-restricted by clicking the **Unrestrict To Application Area** icon.

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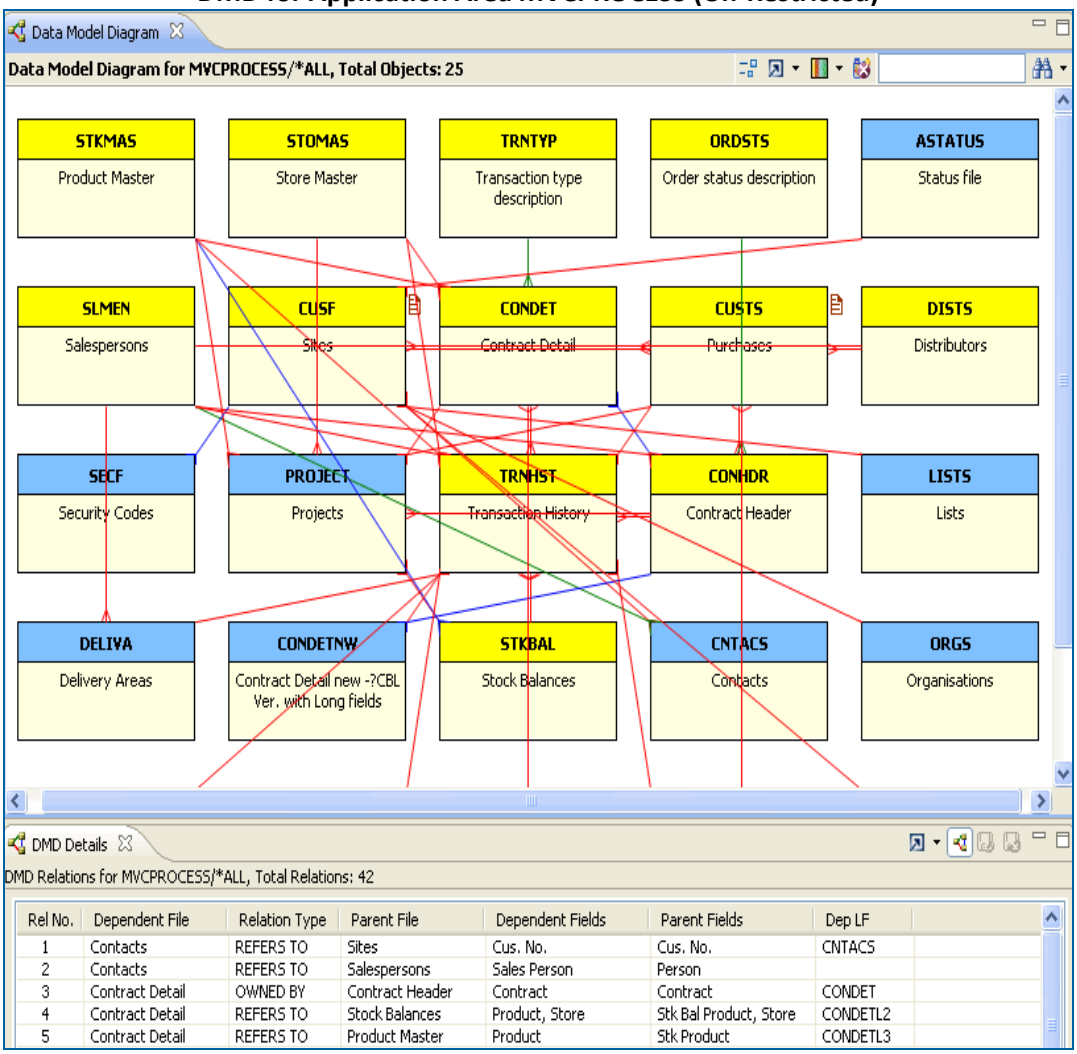
DMD for Application Area MVCPROCESS (Un-Restricted)



Note: While using the 'Restrict To Application Area' feature, ensure that the originally-selected application area is not changed.

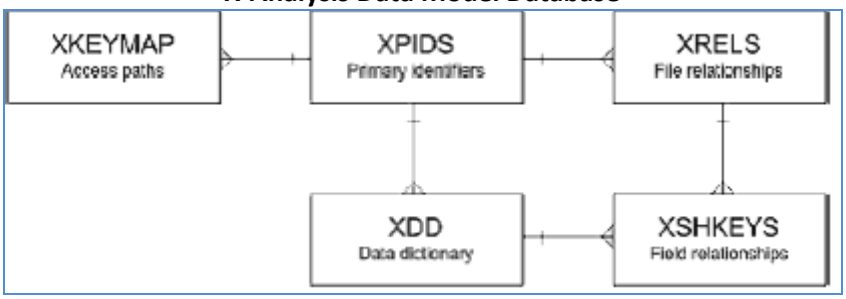
UNDERSTANDING DATA MODEL DATABASE

The metadata database that underlies X-Analysis is a valuable resource and contains information that can be leveraged for your own purposes.

There are five core tables that are generated by the X-Analysis data modelling process. These tables are listed below.

Feature	Brief Description
XPIDS	Primary identifiers
XDD	Data dictionary
XRELS	Relationships
XSHKEYS	Relationship detail
XKEYMAP	Access paths

X-Analysis Data Model Database



The easiest way to view the data in the data model is to use the **Data Dictionary** facility provided within X-Analysis.

1. Open the Customer Maintenance System in X-Analysis.
2. Click the **Data Dictionary** icon on the toolbar.

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Options on Screen Components

X-Analysis is equipped with a set of options that provides you with significant details about the application like source codes, business rules, data content, and other similar information. The following options are covered under the Screen Components feature.

- Screen Source Code
- Function Editor
- Preview Designer
- Page Designer
- Data Content
- Screen Actions
- Class Diagram
- Business Rules
- Component Documenter
- Annotate

Screen Source Code

Select the **Screen Source Code** option to display the source code for the associated display file. A new source browser window will be invoked, displaying the source member of the associated display file.

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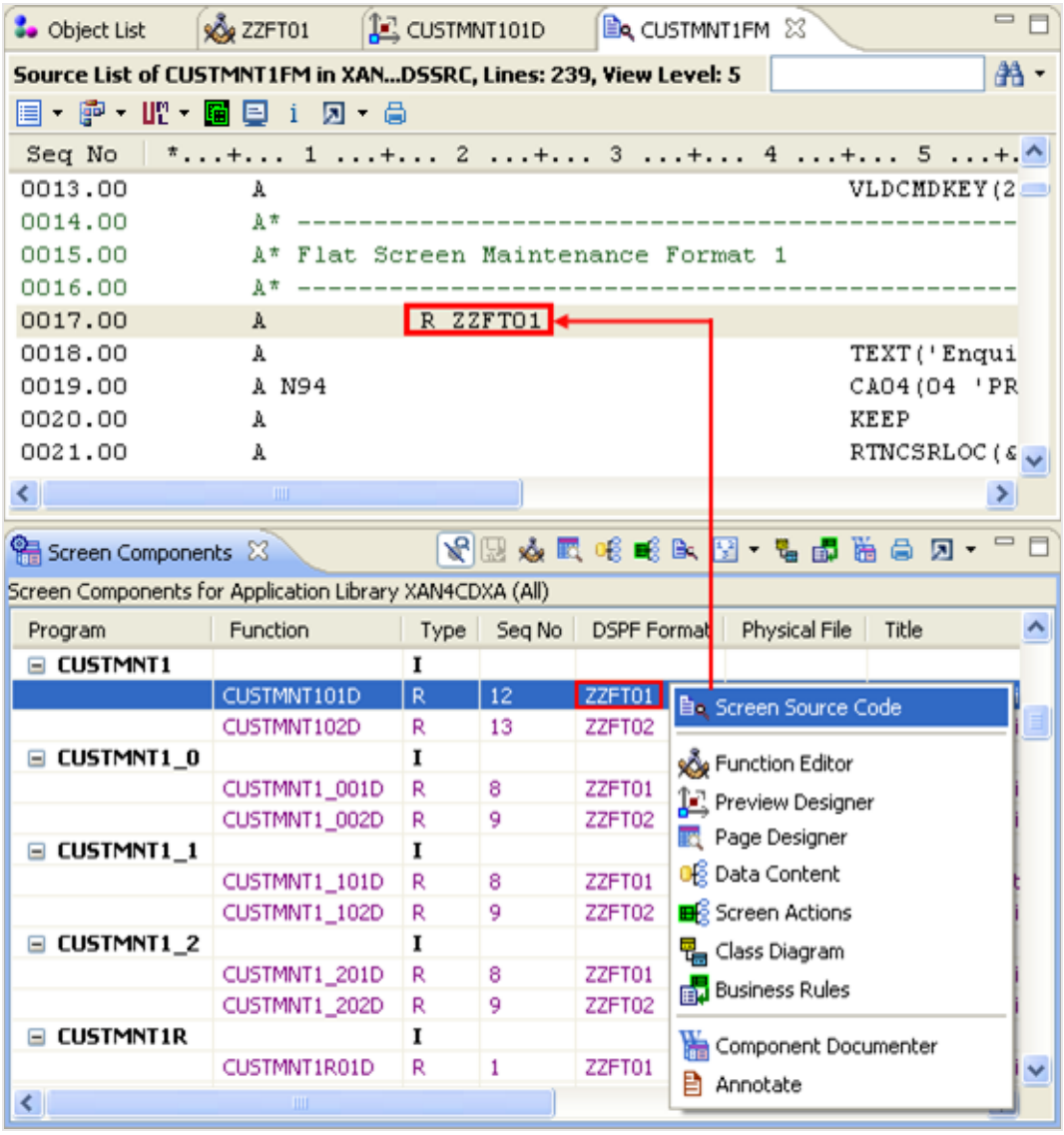
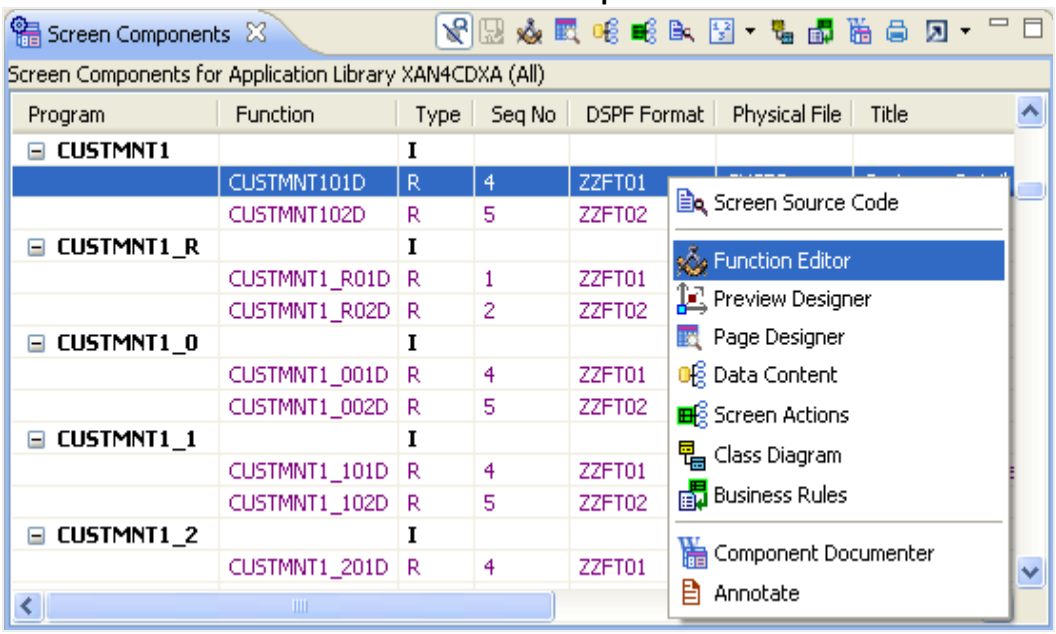
Screen Source Code window



FUNCTION EDITOR

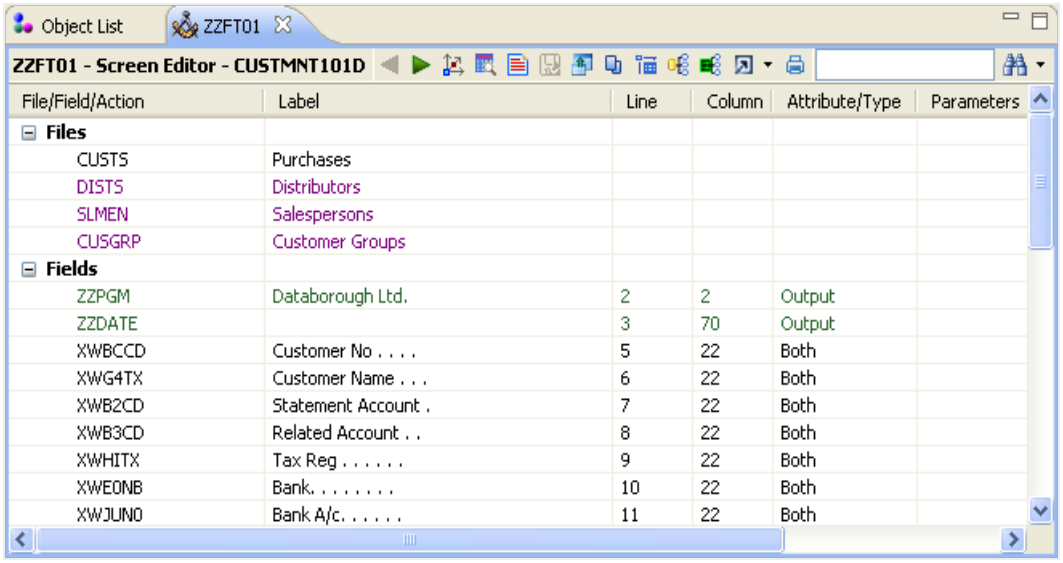
The **Function Editor** option allows you to modify a given function. Right-click over a selected Screen Component for the context menu, as shown below:

Function Editor option



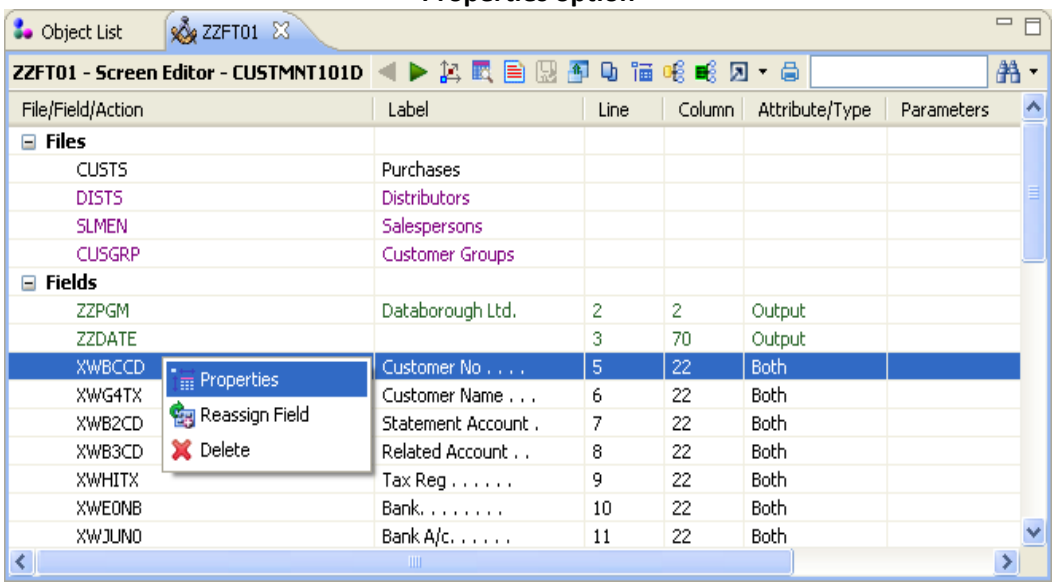
Select the **Function Editor** option to invoke the following window:

Function Editor window



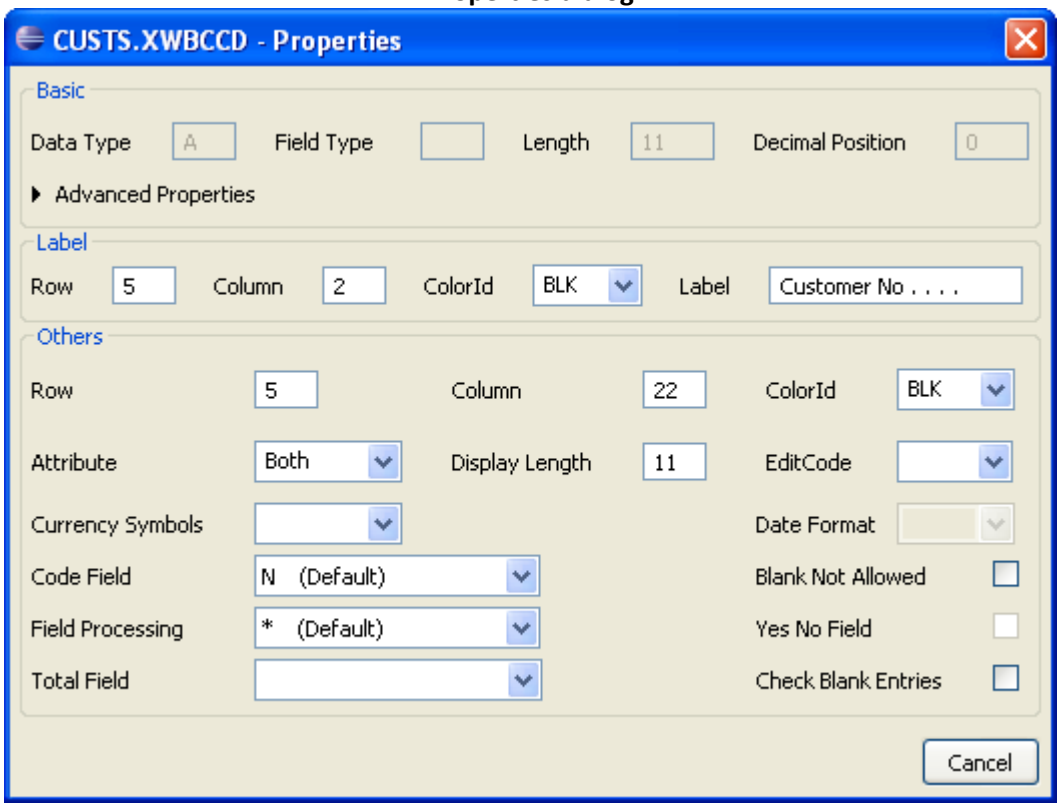
Select a particular field, and right-click over it for the context menu. The context menu will display the **Properties** option as shown below:

Properties option



Click this option to invoke the following dialog. You can make the necessary modifications in this.

Properties dialog



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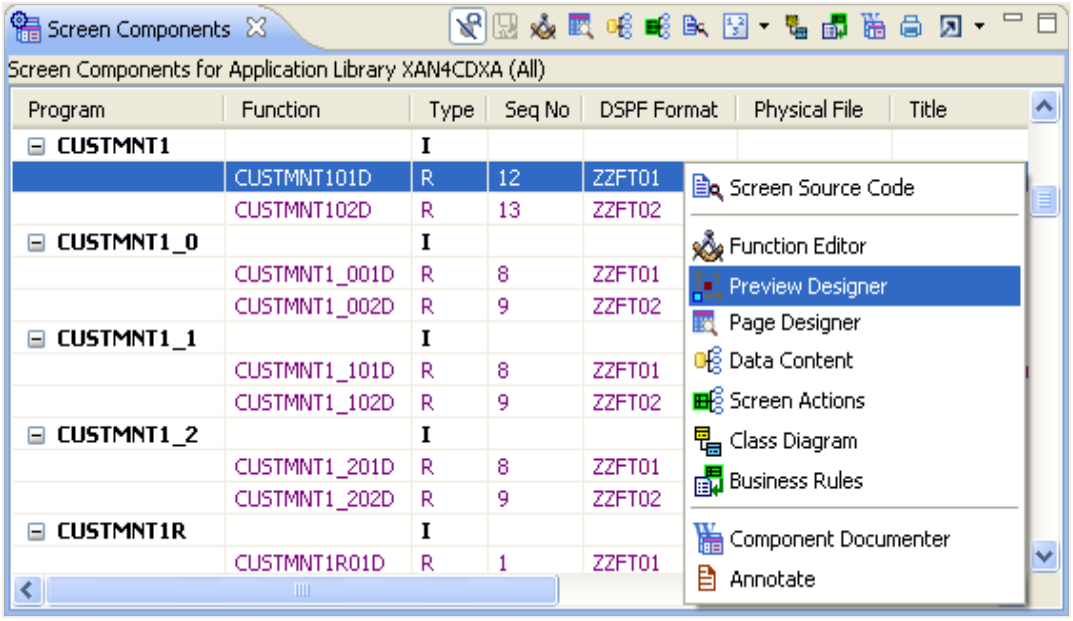
Preview Designer

The **Preview Designer** option is the outline of the Page Designer. Use the options in the Preview Designer window to make changes such as adding constants, or modifying page layout.

After the changes are applied, they subsequently show up on the Page Designer window.

Preview Designer option



Right-click on a Screen Component for the context menu and select the **Preview Designer** option to invoke the following window:

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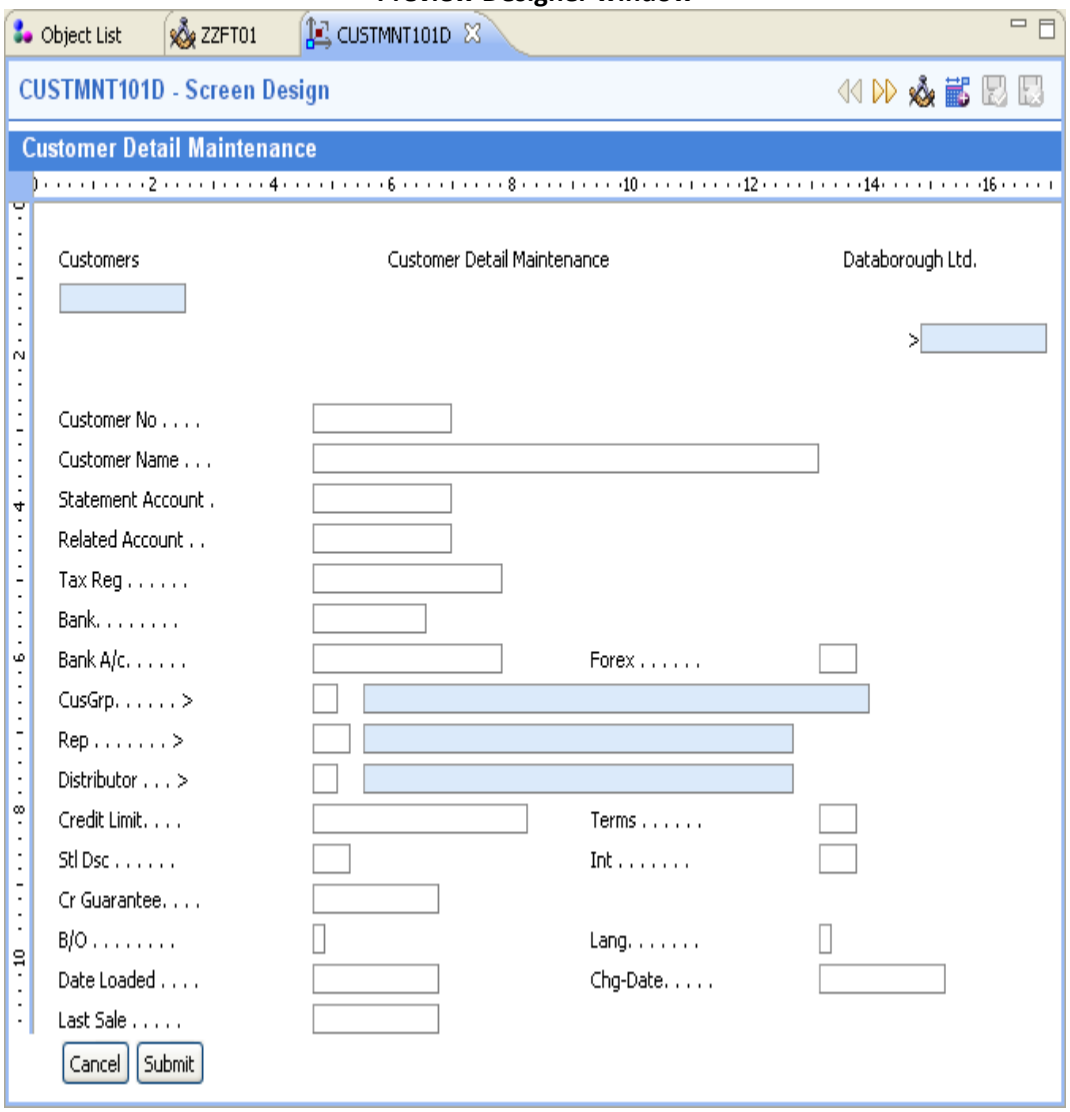
Preview Designer window


Object List
ZZFT01
CUSTMNT101D
CUSTMNT101D - Screen Design
Customer Detail Maintenance
Customers
Customer Detail Maintenance
Databorough Ltd.
Customer No . . . .
Customer Name . . .
Statement Account .
Related Account . .
Tax Reg . . . . . .
Bank. . . . . .
Bank A/c. . . . . .
Forex . . . . . .
CusGrp. . . . . >
Rep . . . . . >
Distributor . . . >
Credit Limit. . . .
Terms . . . . . .
Stl Dsc . . . . . .
Int . . . . . .
Cr Guarantee. . . .
B/O . . . . . .
Lang. . . . . .
Date Loaded . . . .
Chg-Date. . . . .
Last Sale . . . . .
Cancel
Submit

PAGE DESIGNER

X-Analysis allows you the access to two versions of page design via the **Page Designer** option. Set the option on the **X-Redo Advanced Preferences** window (refer to the image below). The default option to edit the selected page is Eclipse.

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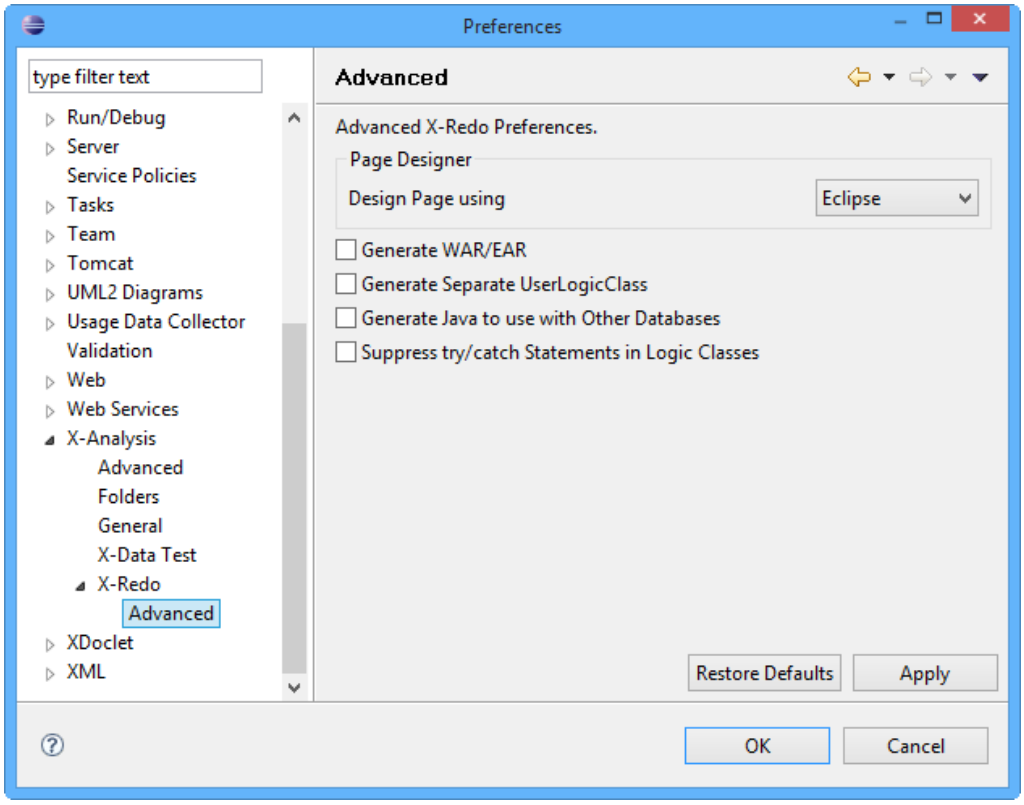
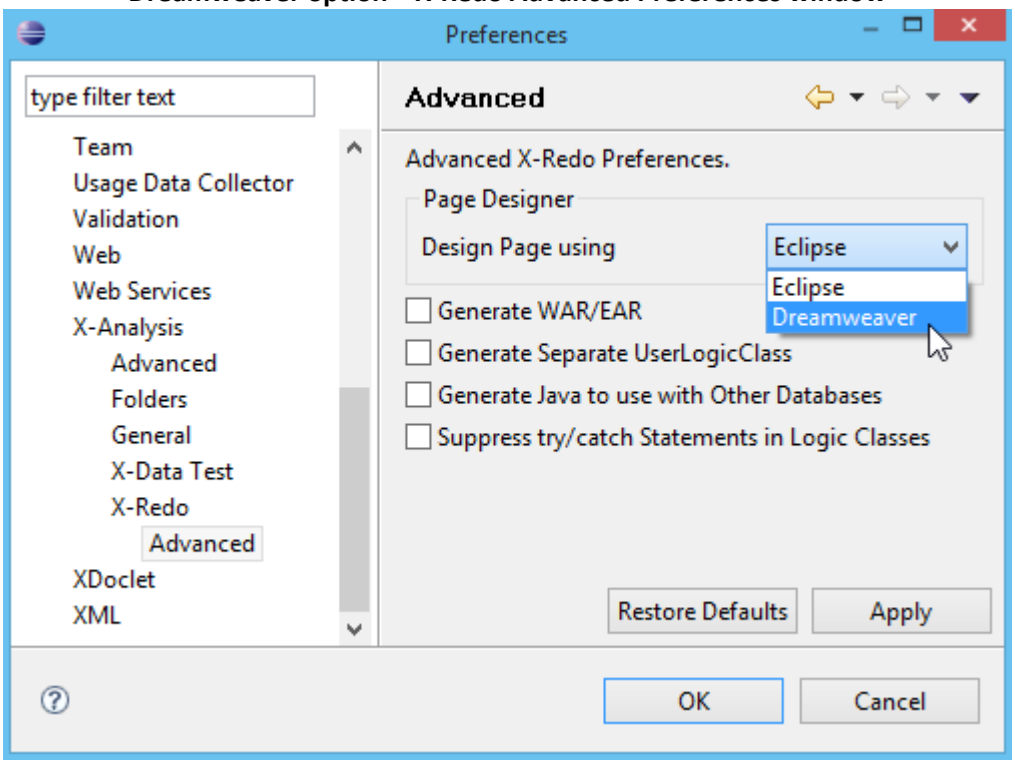
X-Redo Advanced Preferences window



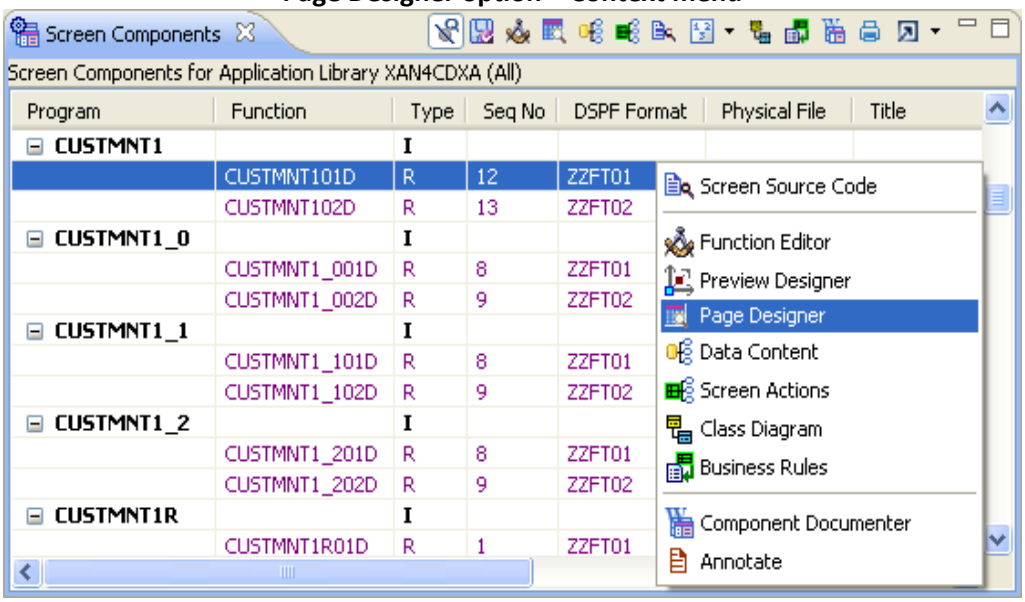
Alternatively, you can edit page/s using Dreamweaver. If Dreamweaver is installed on your machine, then the drop-down will show it as an option. After setting the Page Designer preference as Dreamweaver in the **X-Redo Advanced Preferences** window, restart the X-Analysis plugin to invoke Adobe's Dreamweaver software for designing a web page.

Dreamweaver option – X-Redo Advanced Preferences window



Right-click on a Screen Component for the context menu and select the **Page Designer** option, as displayed underneath:

Page Designer option – Context menu



The following screenshot displays the Page Designer window in the Eclipse mode:

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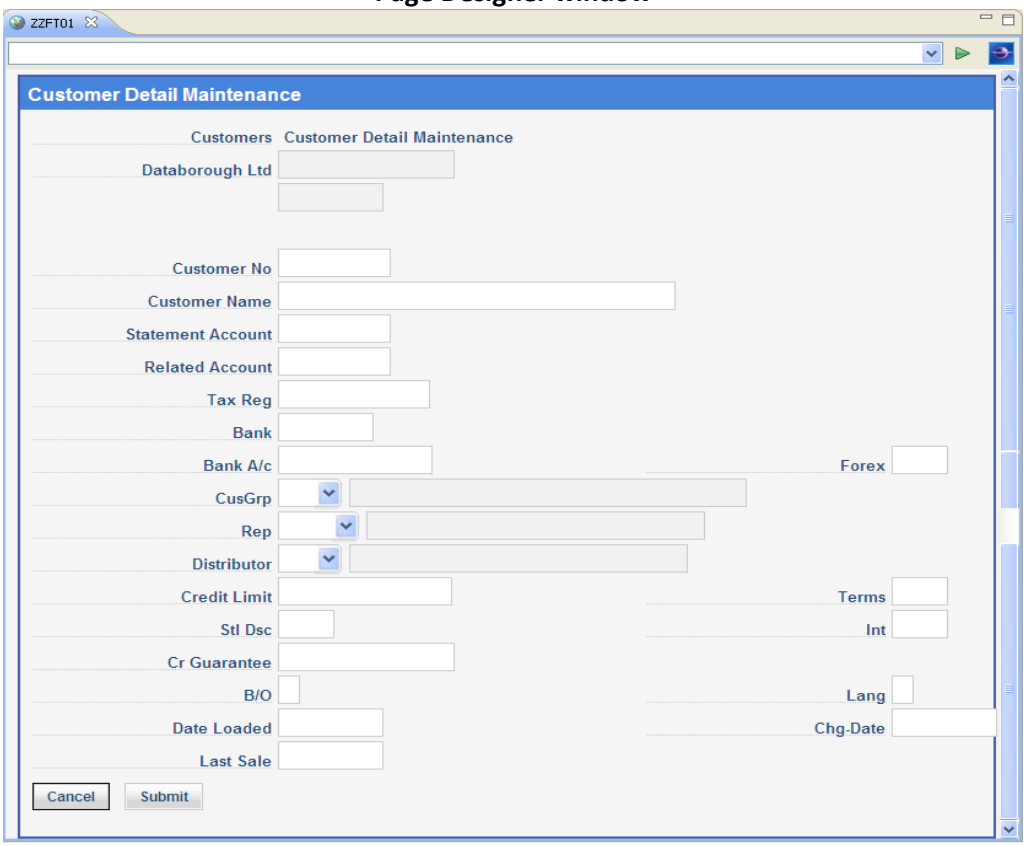
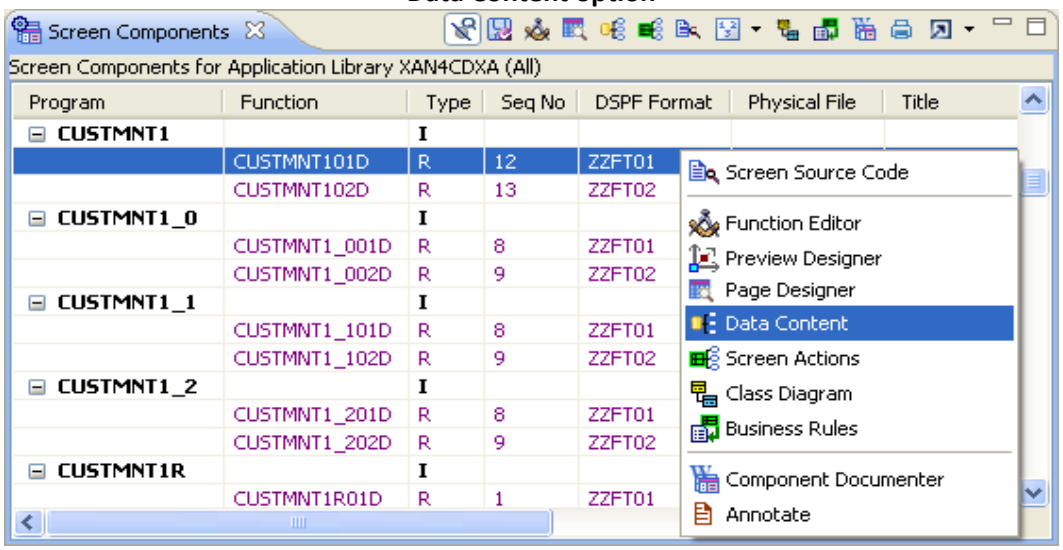
Page Designer window



DATA CONTENT

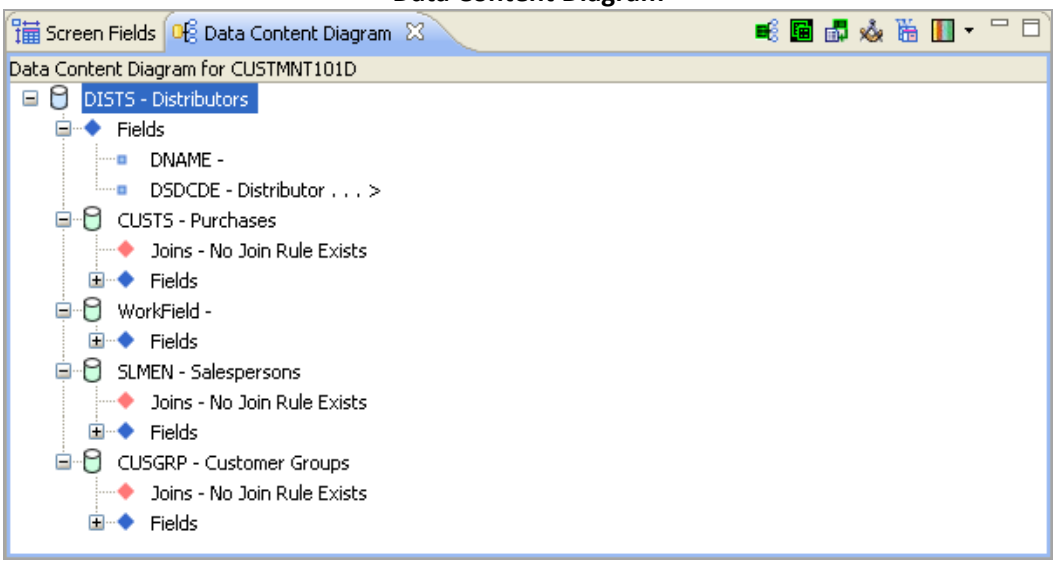
Select the **Data Content** option to access further relevant details of a particular file. The option is available for all Screen Components and Development Screens. Right-click on a Screen Component for the context menu and select the **Data Content** option, as shown below:

Data Content option



The Data Content Diagram generated for a screen uses the model information to depict the primary file in use by that screen shown in blue. The sub-node is the secondary file (in green) with which the primary file joins to pull the additional information to show on the screen. The sub-node splits into two parts. The first part displays **Joins** - lists the field(s) from the secondary file facilitating the file join; the second part displays **Fields** - lists the field(s) from the primary file.

Data Content Diagram



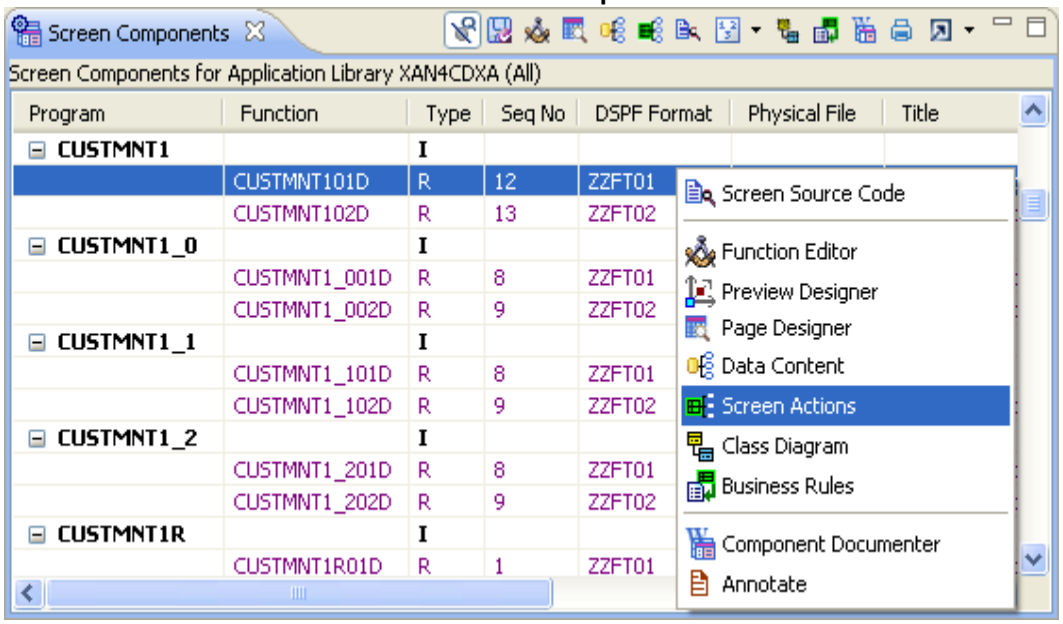
Screen Actions

The Screen Actions Diagram presents the actions allowed on the screen. The actions could be:

- Prompt Action – To look up for the possible values for a field, facilitated by the join on the secondary/foreign file.
- Submit Action – Usually on the record screen or a form, which submits the data for validation and moves on.
- Navigation Action – To branch off to a new screen. Usually on the grids or record screens being viewed in the display mode.

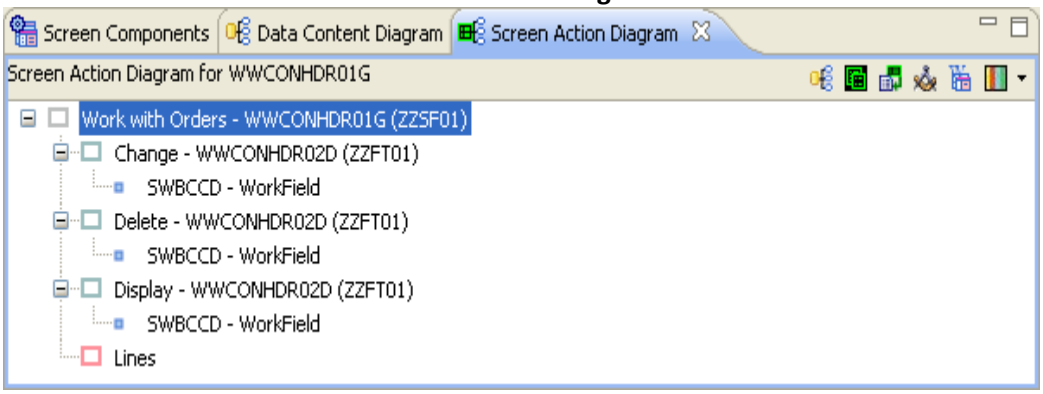
Right-click for the context menu over a selected Screen Component and select the **Screen Actions** option, as shown below:

Screen Actions option



The **Screen Actions** option is available for all Screen Components and Development Screens.

Screen Action Diagram



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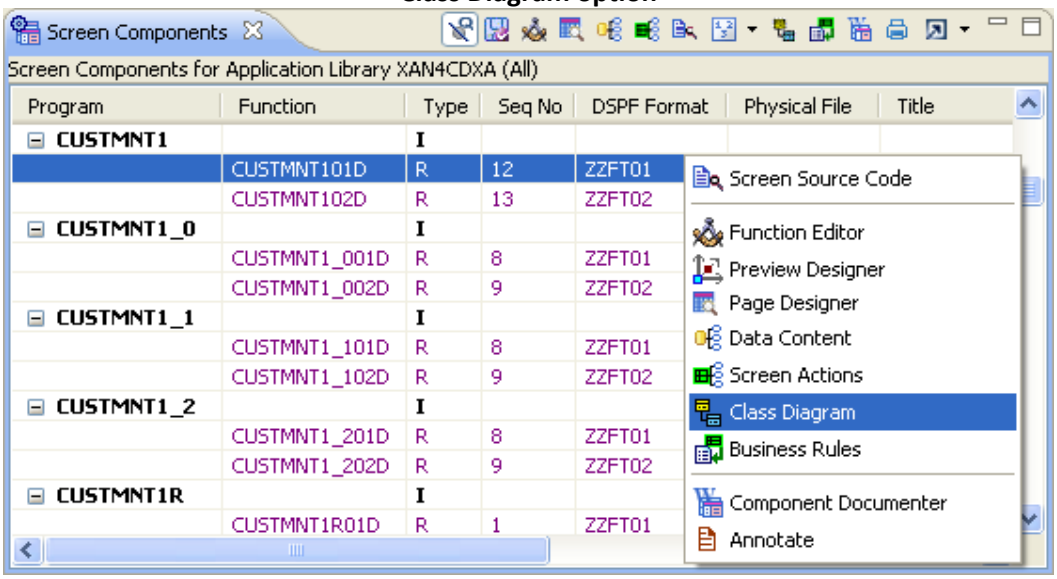
CLASS DIAGRAM

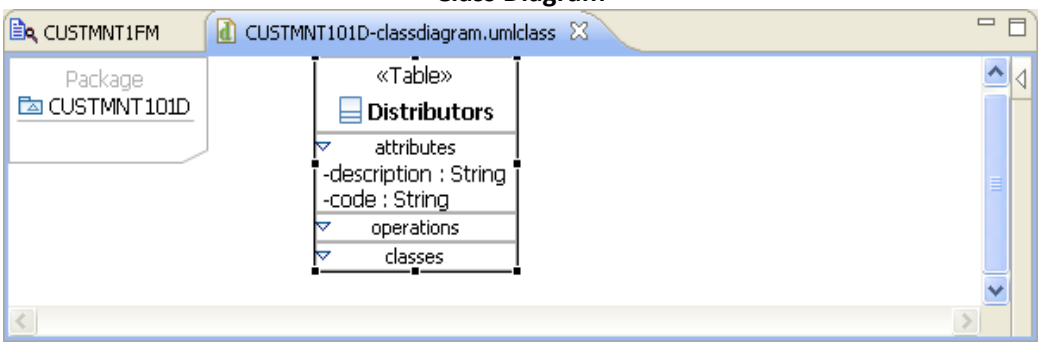
Select the **Class Diagram** option to generate the UML class diagram. Right-click for the context menu on a Screen Component and select the **Class Diagram** option. :

Class Diagram option



The **Class Diagram** option is available for all Screen Components and Development Screens.

Class Diagram



BUSINESS RULES

Business rules are defined as discrete blocks of program logic gathered during the design recovery process, which describe data processes that are independent of both the data model and the environment. The rule narration too is held along with the rule for better understanding.

Right-click for the context menu on a Screen Component and select the **Business Rules** option, as shown below:

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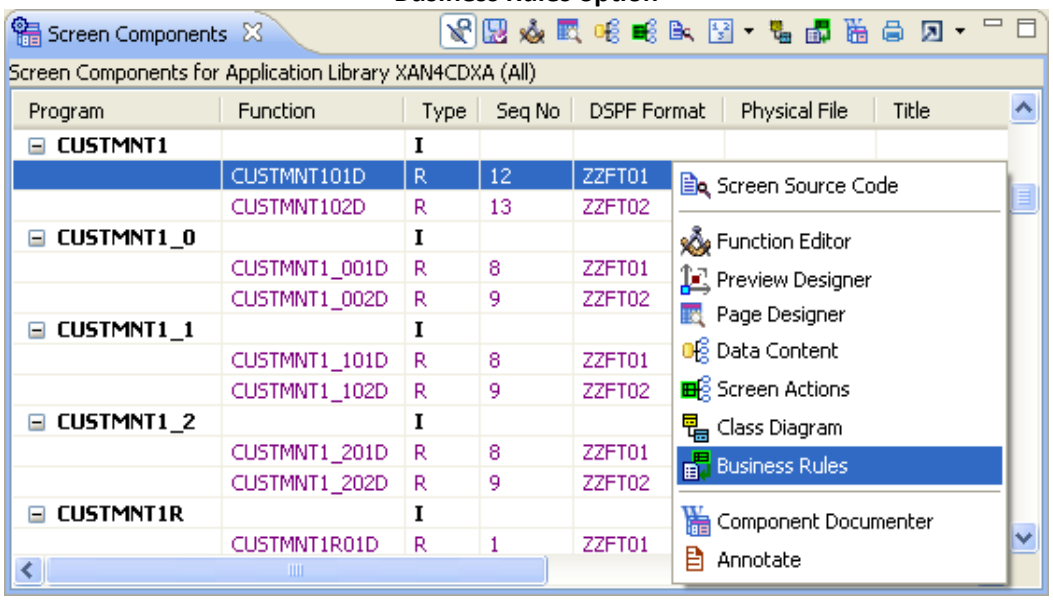
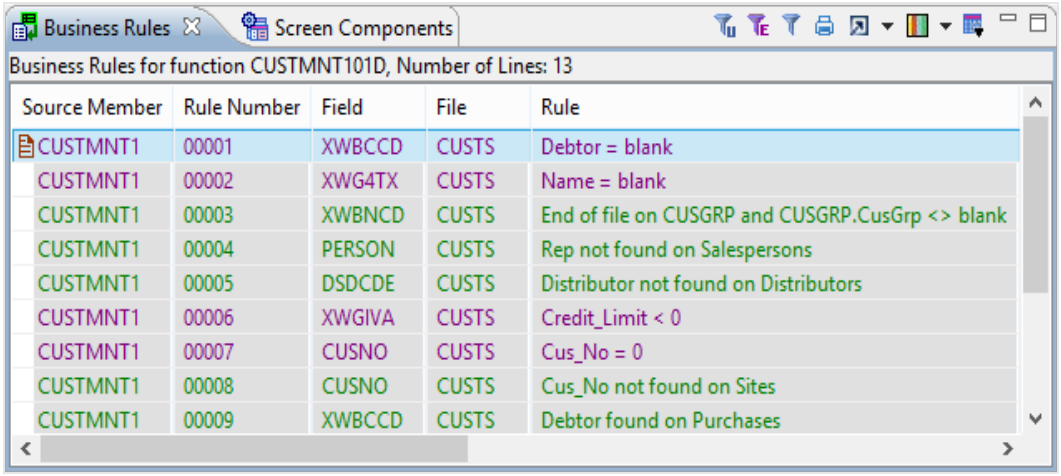
Business Rules option



The business rules for the source member will get listed. The business rules are listed only when the **Derive Business Rules** option has already been opted on the source member.

Business Rules


Business Rules
Screen Components
Business Rules for function CUSTMNT101D, Number of Lines: 13
Source Member
Rule Number
Field
File
Rule
CUSTMNT1 00001 XWBCCD CUSTS Debtor = blank
CUSTMNT1 00002 XWG4TX CUSTS Name = blank
CUSTMNT1 00003 XWBNCD CUSTS End of file on CUSGRP and CUSGRP.CusGrp <> blank
CUSTMNT1 00004 PERSON CUSTS Rep not found on Salespersons
CUSTMNT1 00005 DSDCDE CUSTS Distributor not found on Distributors
CUSTMNT1 00006 XWGIVA CUSTS Credit_Limit < 0
CUSTMNT1 00007 CUSNO CUSTS Cus_No = 0
CUSTMNT1 00008 CUSNO CUSTS Cus_No not found on Sites
CUSTMNT1 00009 XWBCCD CUSTS Debtor found on Purchases

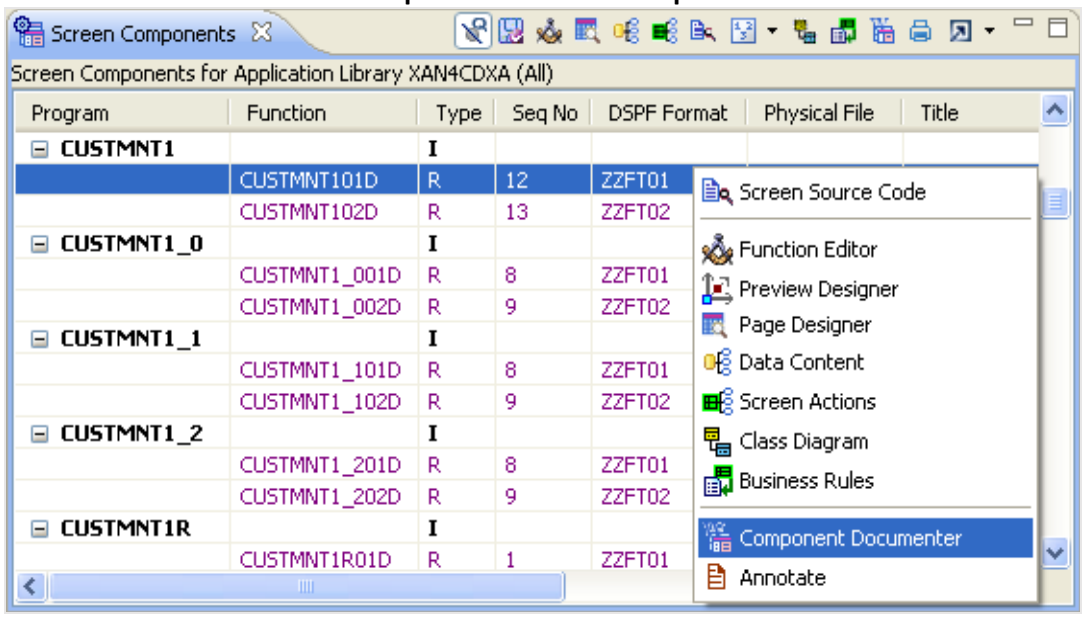
COMPONENT DOCUMENTER

The **Component Documenter** option documents the extracted Screen Components (Re-engineered Functions). The following information is documented:

- Additional Header Info – This includes the function header information.
- Data Content – This includes the data content diagram.
- Screen Actions – This includes the screen action diagram.

- Screen Design – This includes the Screen Design for all formats.
- Residual Logic – This includes the business process logic for the selected screen component.
- Business Rules – This includes the business rules for the selected screen component.

Component Documenter option



For more details, refer to **Appendix C.**

ANNOTATE

The **Annotate** option is available to provide annotates to a specific function. Right-click on a Screen Component for the context menu and select the **Annotate** option, as displayed underneath:

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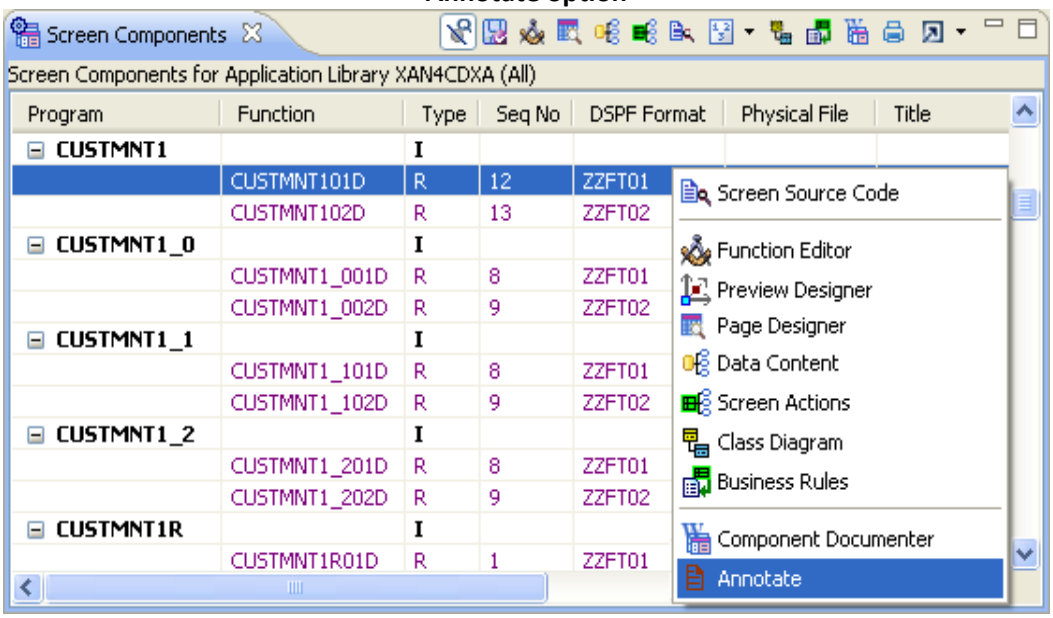
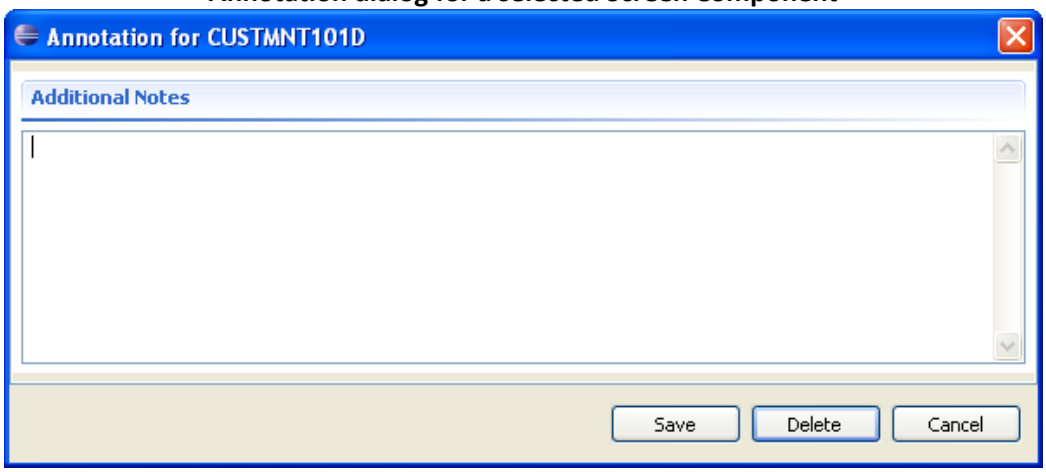
Annotate option



The following dialog box is invoked in which you can write notes. Subsequently, click the related buttons to **Save**, **Delete**, or **Cancel** annotates.

Annotation dialog for a selected Screen Component



DEVELOPMENT SCREENS

X-Analysis provides the following options on Development Screens:

- Function Editor
- Preview Designer
- Page Designer
- Data Content
- Screen Actions
- Class Diagram
- Business Rules

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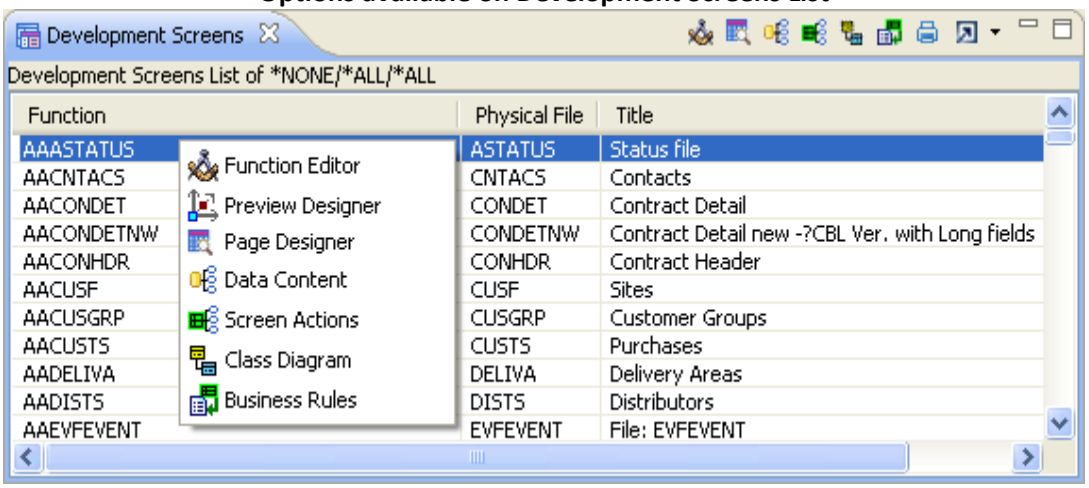
Options available on Development Screens List



All these options available on Development Screens are already discussed under the Screen Components section.

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Business Rules Analysis

Fresche Legacy's Business Rules Extraction software, **X-Rules**, can be used to highlight the business rules within a source member using X-Analysis. Using **X-Rules**, the business logic may be identified and narrated from individual programs or parts of the entire system. This business logic, thus extracted, is analyzed and documented using the various related features of X-Analysis.

The Business Rules of an application are what makes the application function uniquely. While X-Analysis can expose the Business Rules implicit in the data and process models of an application, this does not entirely account for the vast amount of business logic that is buried inside the source code of the programs.

X-Rules is capable of identifying and narrating this logic automatically from individual programs or parts of the entire system. The business rules logic can then be analyzed and documented with the powerful and interactive source browser integrated with X-Analysis.

Business Rules

The program source is grouped into discrete blocks of logic so that each block represents a particular execution of a business rule. This block of code is then converted into 'Pseudo Code' that describes the execution of the logic. Literals and constants are liberally used in the narration, wherever possible, giving very accurate descriptions of the logic. Each rule has an exclusive identifier that makes system-wide analysis and documentation of business rules possible in X-Analysis.

The entire process is achieved by invoking a single command on X-Analysis. The business rules generation process identifies the various components of the business rules and writes them to either:

1. A new source member or
2. An index over the original source member.

X-Analysis can display business rules automatically using the generated index.

X-Rules not only identifies the Business Rules Logic, but also generates a prototype application for a part of the original application.

X-Rules uses the X-Analysis cross-reference database and the original application program source code to provide shadow programs for the functions in the prototype application. These shadow programs contain all the business rules logic from the original programs. These rules include all field validation that is additional to the normal database integrity checks (which are generated automatically), calls to batch programs for additional functions, and secondary file processing.

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The primary criteria to track Business Rules are the presence of CAS, COMP, IF, ELSEIF, and WHEN statements.

For the secondary criteria, the following are specified:

- The condition involves one or more database fields.
- The condition contains the screen fields which get tracked to the database fields.
- The condition involves the %EQUAL, %FOUND, %EOF built-in functions.
- The condition contains the resulting indicators for the database I/O operations (analogous to %EQUAL, %FOUND, and %EOF built-in functions).
- The presence of the conditioning indicators for some other operation codes (e.g. CHECK, SCAN, LOOKUP).

Based on the above specifications, the recovered logic contains the following business rules components:

- Field Validations
- Calls to other (significant) programs
- Secondary (database) file updates
- Non-owner file reads

DERIVE BUSINESS RULES

This option is available on the context menu of a cross-reference library and an application area. The Business Rules may only be generated for RPG, RPGLE, and CBL objects (*PGM type).

The **Derive Business Rules** option on an individual program calls the **XBIZRULES** command. This command uses the X-Analysis databases to re-engineer all relevant functionality from a legacy program.

The extracted code comprises the following:

- Validations
- Batch Program Calls
- Secondary File Updates
- Non-owner File reads

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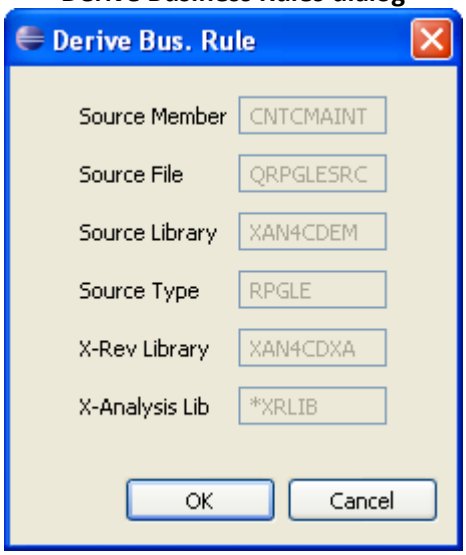
The **Derive Business Rules** option on an individual ***PGM** object invokes the following dialog:

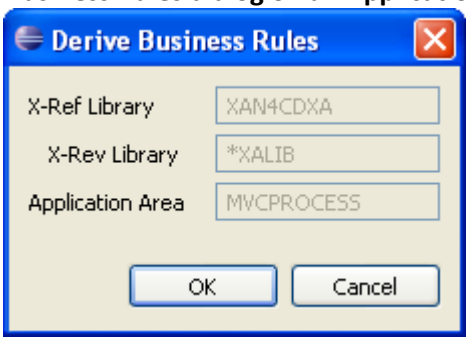
Derive Business Rules dialog



The process involves identifying certain key components of the program, including message statements, return codes, and validation flags. Then, the significant update files are identified. After the process is over, the program is scanned for statements which represent any of the above logic types. These statements are written to the file **XEXTRGLINS** – the "Trigger Lines" file, which is then used to produce the required output.

The **Derive Business Rules** option for the entire application or a single application area calls the **XGENBRULES** command.

Derive Business Rules dialog on an Application Area



This command will identify the business rules logic in each program in the application over which the specified cross-reference database has been built. A source member containing the business rules logic and narrative describing each rule is generated for each program. This is achieved by invoking the **XBIZRULES** X-Model command for each program in the application.

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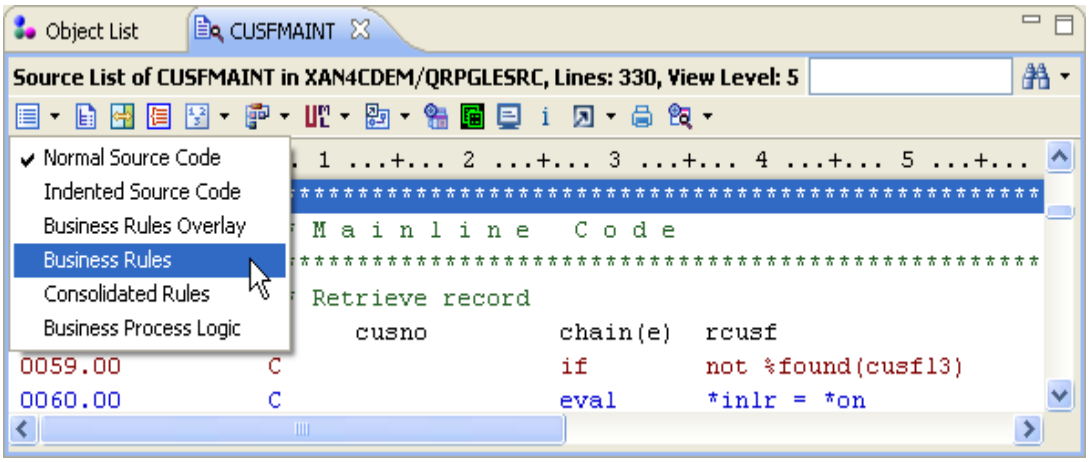
VIEW BUSINESS RULES

X-Analysis can display Business Rules automatically using the generated index.

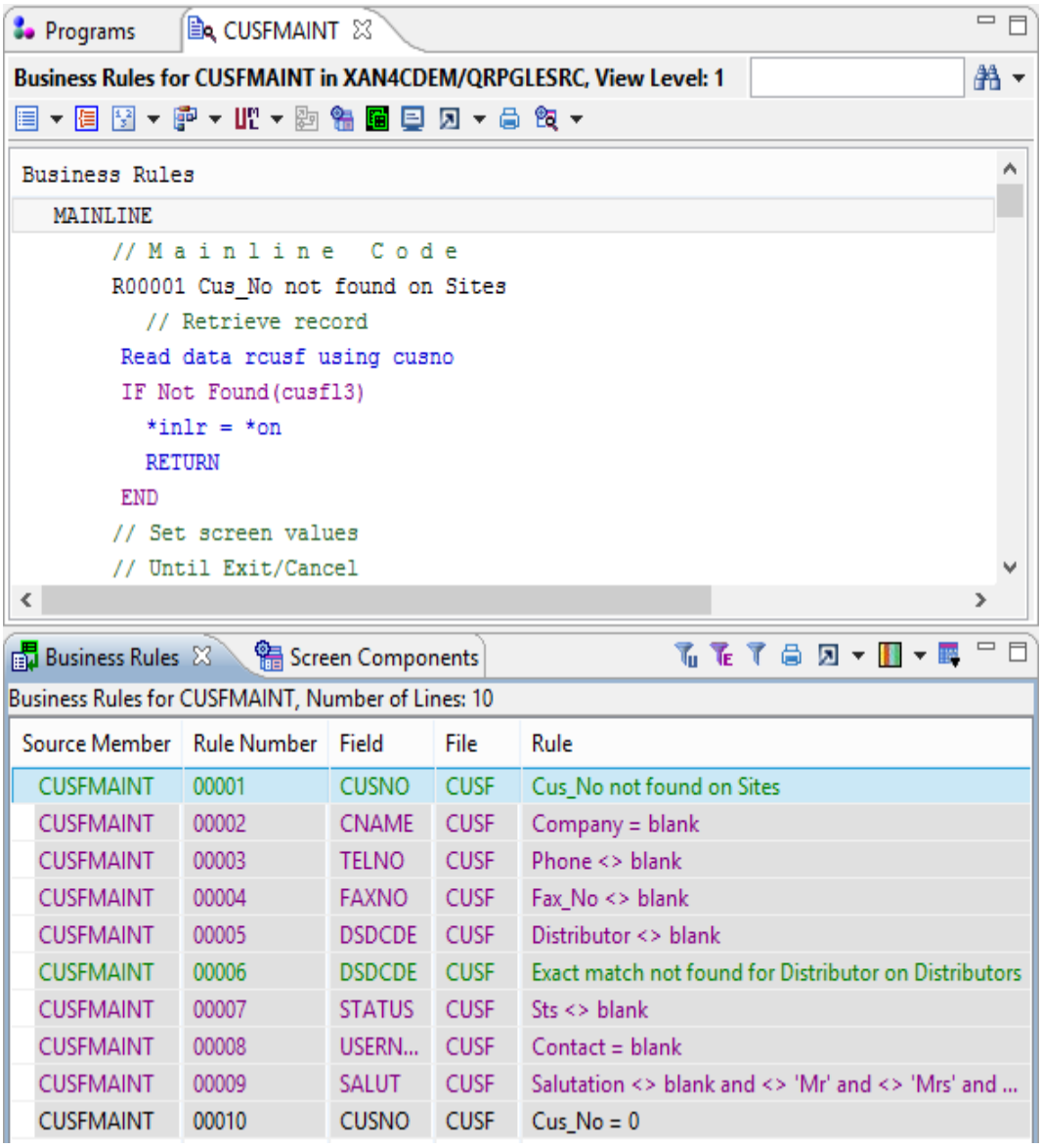
X-Analysis allows the display of the source member for any program in the application. When the source member is displayed, click the **Source Options** drop-down menu and select **Business Rules** to see the business rules logic highlighted within the member. You can immediately see the business logic within the context of the program as a whole.

Source Code of CUSFMAINT


Object List
CUSFMAINT
Source List of CUSFMAINT in XAN4CDEM/QRPGLESRC, Lines: 330, View Level: 5
Normal Source Code
Indented Source Code
Business Rules Overlay
Business Rules
Consolidated Rules
Business Process Logic
1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+...
M a i n l i n e C o d e
Retrieve record
cusno chain(e) rcusf
0059.00 C if not %found(cusfl3)
0060.00 C eval *inlr = *on

The following window is invoked:

Business Rules for CUSFMAINT



Source Member	Rule Number	Field	File	Rule
CUSFMAINT	00001	CUSNO	CUSF	Cus_No not found on Sites
CUSFMAINT	00002	CNAME	CUSF	Company = blank
CUSFMAINT	00003	TELNO	CUSF	Phone <> blank
CUSFMAINT	00004	FAXNO	CUSF	Fax_No <> blank
CUSFMAINT	00005	DSDCDE	CUSF	Distributor <> blank
CUSFMAINT	00006	DSDCDE	CUSF	Exact match not found for Distributor on Distributors
CUSFMAINT	00007	STATUS	CUSF	Sts <> blank
CUSFMAINT	00008	USERN...	CUSF	Contact = blank
CUSFMAINT	00009	SALUT	CUSF	Salutation <> blank and <> 'Mr' and <> 'Mrs' and ...
CUSFMAINT	00010	CUSNO	CUSF	Cus_No = 0

The Business Rules view also displays columns for Error Message, Business Rule Annotation, Rule Status, and Rule Status Comment. The columns can be seen in the image underneath.

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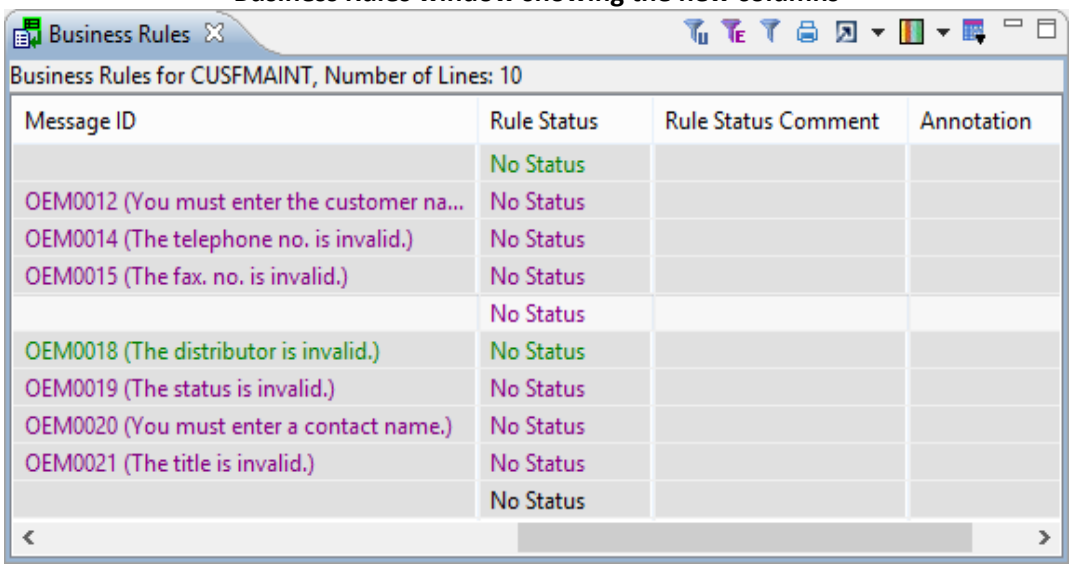
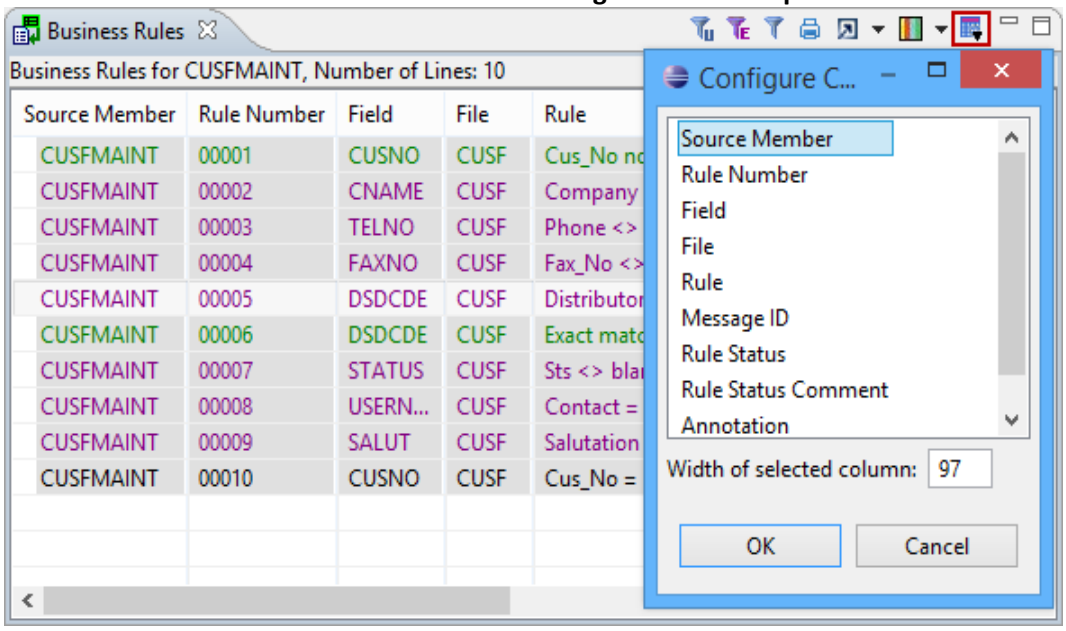
Business Rules window showing the new columns


Business Rules
Business Rules for CUSFMAINT, Number of Lines: 10
Message ID
Rule Status
Rule Status Comment
Annotation
No Status
OEM0012 (You must enter the customer na...
OEM0014 (The telephone no. is invalid.)
OEM0015 (The fax. no. is invalid.)
OEM0018 (The distributor is invalid.)
OEM0019 (The status is invalid.)
OEM0020 (You must enter a contact name.)
OEM0021 (The title is invalid.)

The **Configure Columns** feature in the Business Rules view helps you manage the columns displayed. You can reduce the width or hide any column by setting width to 0.

Business Rules window – Configure Columns option



Filter the display of business rules using the various buttons. The rules can be filtered based on whether they are Exportable Rules, Update Rules, or Excluded Rules. These three filters have toggle behavior.

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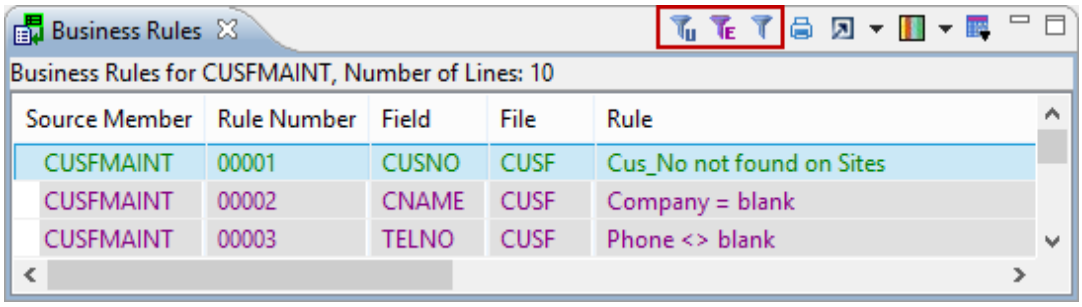
Business Rules window – Filter buttons



Note: For details regarding Business Rules Status, refer to Appendix L.

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Inter-Repository Options

The **Inter-Repository Options** provides different sub-options for comparing database files (across any two cross-reference libraries) and managing linked repositories.

The **Difference Analysis** option analyzes the application database files and reports the difference with the files.

The **PTF Analysis** option analyzes the base and the customized applications for PTF analysis.

The **Manage Linked Repositories** option allows analysis of one or more IBM i and/or non-IBM i (Windows) cross-reference library to an existing cross-reference library.

The **Inter-Repository Options** is available on the context menu of the cross-reference library. The following group of options is available under it:

- Difference Analysis
- Generate Difference Analysis
- Display Difference Analysis
- PTF Analysis
- Customized Libraries
- Generate PTF Analysis
- PTF Analysis
- Manage Linked Repositories

Note: Fresche Legacy supplies the following two additional data libraries for demonstrating Difference Analysis and PTF Analysis:

XAN4CDEMCU – This library contains objects from XAN4CDEM with simulated changes.

XAN4CDEMPT – This library contains simulated PTF for XAN4CDEM.

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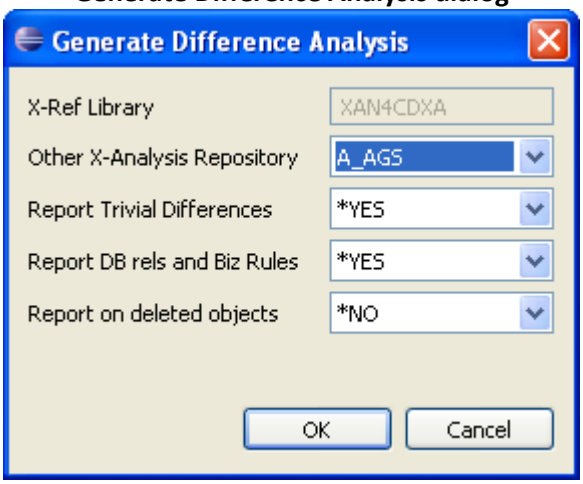
GENERATE DIFFERENCE ANALYSIS

The **Generate Difference Analysis** option submits a batch job which populates data for Difference Analysis. You must provide the cross-reference library name which will used to compare the cross-reference libraries.

The following dialog is displayed when you select the **Generate Difference Analysis** option:

Generate Difference Analysis dialog



DISPLAY DIFFERENCE ANALYSIS

The **Display Difference Analysis** option displays the differences of the application database files and programs. The difference analysis data is available only when the difference analysis has been generated by selecting the **Generate Difference Analysis** option.

Demo Case – Display Difference Analysis

Create a demo case for better understanding of Display Difference Analysis. Follow the given steps:

1. Create a new X-Analysis application (call it **XAN4CDXC**) with the following libraries:

   Source:

   XAN4CDEMCU
   XAN4CDEM

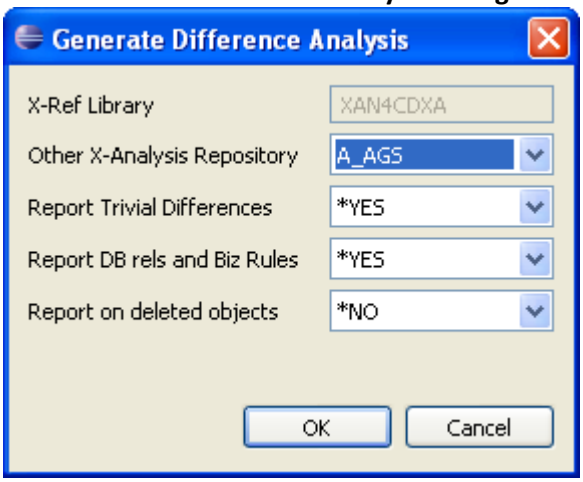
   Object:

   XAN4CDEMCU
   XAN4CDEM

2. Initialize the new application.

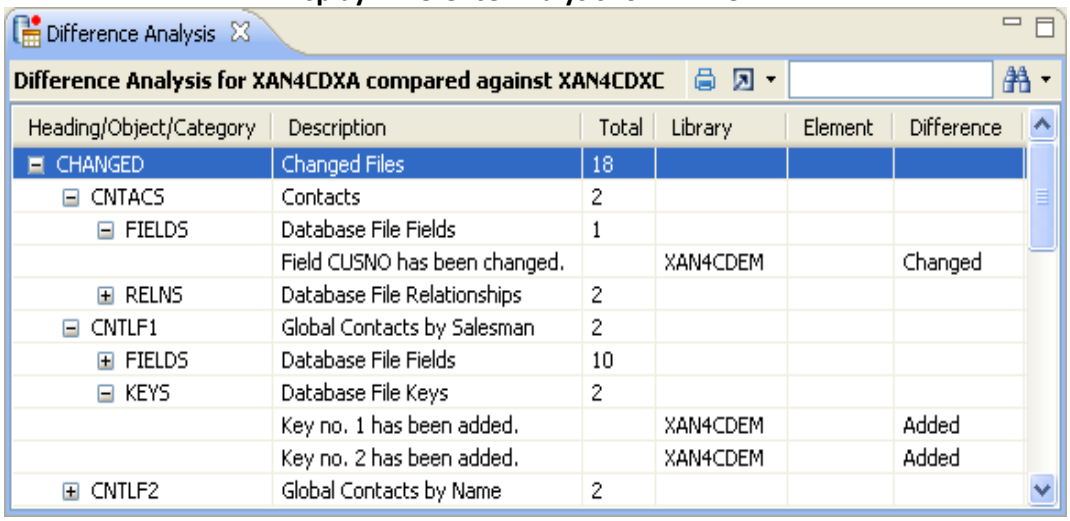
3. To populate Difference Analysis data, opt for the context menu on the new X-Analysis application (**XAN4CDXC**), and then select the **Generate Difference Analysis** option from the **Inter-Repository Options** submenu. Select **XAN4CDXC** from the drop-down box, **Other X-Analysis Repository**. Then, click **OK** to submit the batch job.

Generate Difference Analysis dialog



4. To display the Difference Analysis data, opt for the context menu on the new X-Analysis application (**XAN4CDXC**), and then select the **Display Difference Analysis** option from the **Inter-Repository Options** submenu. The following screen should appear:

Display Difference Analysis for XAN4CDXA



Heading/Object/Category	Description	Total	Library	Element	Difference
CHANGED	Changed Files	18			
CNTACS	Contacts	2			
FIELDS	Database File Fields	1			
	Field CUSNO has been changed.		XAN4CDEM		Changed
RELNS	Database File Relationships	2			
CNTLF1	Global Contacts by Salesman	2			
FIELDS	Database File Fields	10			
KEYS	Database File Keys	2			
	Key no. 1 has been added.		XAN4CDEM		Added
	Key no. 2 has been added.		XAN4CDEM		Added
CNTLF2	Global Contacts by Name	2			

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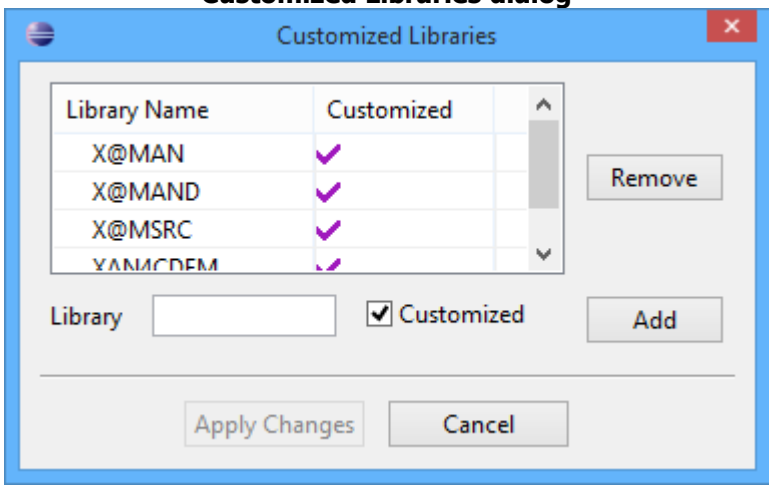
CUSTOMIZED LIBRARIES

A customized library is where you would store programs taken from the vendor's library and modified. In this way you will retain the original programs from the vendor and have their modified version, too. The following dialog is displayed when you select the **Customized Libraries** option:

Customized Libraries dialog

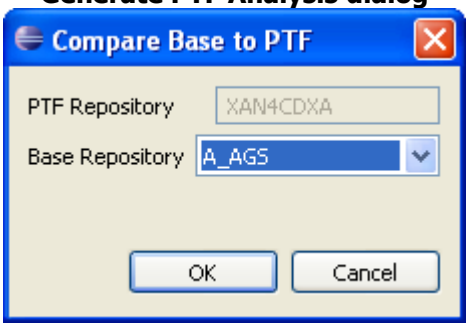


Provide valid entries for Customised Library (ies) and for Non-Customised Library (ies).

GENERATE PTF ANALYSIS

The **Generate PTF Analysis** option submits a batch job which populates data for PTF Analysis. The following dialog is displayed when you select the **Generate PTF Analysis** option:

Generate PTF Analysis dialog



Provide the base repository name in the **Generate PTF Analysis** dialog and this will be used to compare the PTF repository with the base repository.

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PTF ANALYSIS

The PTF Analysis displays the comparison between the PTF repository and the base repository. Select the **Generate PTF Analysis** option first to access the PTF Analysis data.

Demo Case – PTF Analysis

Create a demo case for better understanding of the PTF Analysis.. Follow the given steps to set up the demo case:

1. Create a new X-Analysis application (call it **XAN4CDXP**) with the following libraries:

   Source:

   XAN4CDEMPT

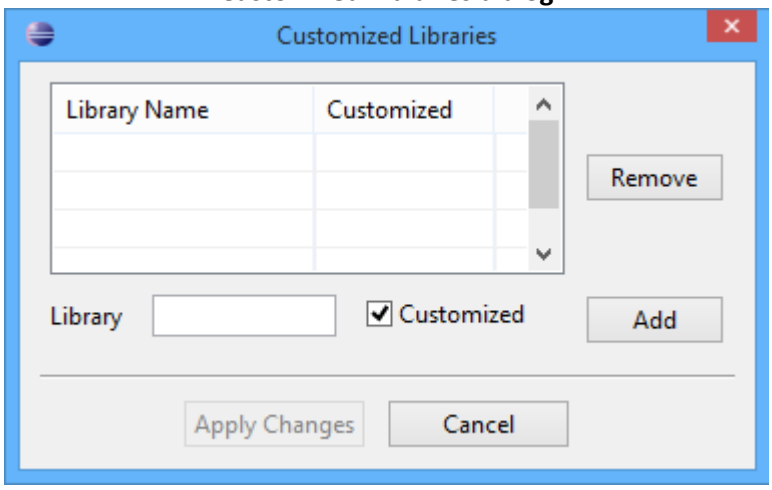
   Object:

   XAN4CDEMPT

2. Initialize the new application – **XAN4CDXP**.

3. To generate the PTF Analysis, the first step is to identify libraries as the customised libraries. Select the X-Analysis application – **XAN4CDXC**, and then select the **Customized Libraries** option from the **Inter-Repository Options** submenu on the context menu. This invokes the following dialog:

Customized Libraries dialog



Type in **XAN4CDEMCU** to the Library text box and check the **Customized** box. Then, click **Add**. This adds the **XAN4CDEMCU** library as the customized library.

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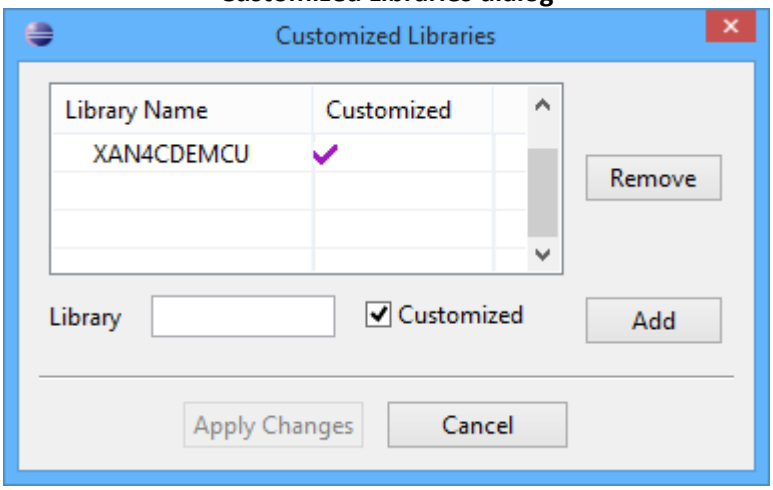
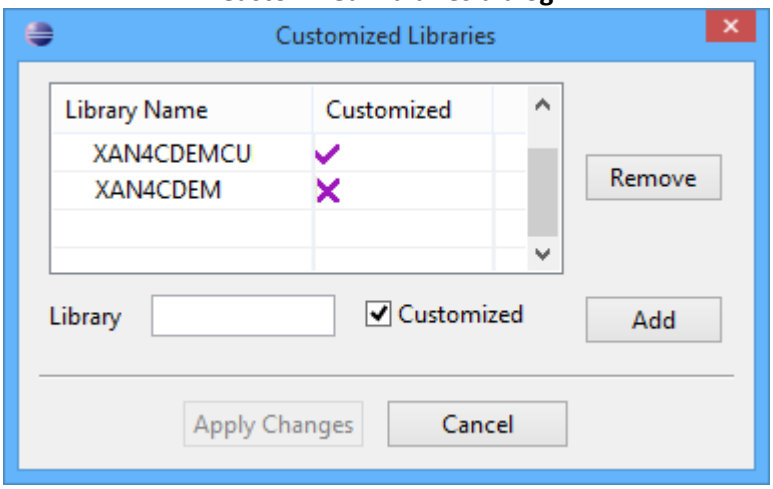
Customized Libraries dialog



Now, add the **XAN4CDEM** library as non-customized library. Type in **XAN4CDEM** to the **Library** text box and un-check the **Customized** box. Then, click **Add**. This adds the **XAN4CDEM** library as a non-customized library.

Customized Libraries dialog



4. The next step is to select the **Generate PTF Analysis** option. Opt for the context menu on the X-Analysis application – **XAN4CDXP**, and select the **Generate PTF Analysis** option from the **Inter-Repository Options** submenu. Enter **XAN4CDXC** in the Base Repository. Click **OK** to submit the batch job.

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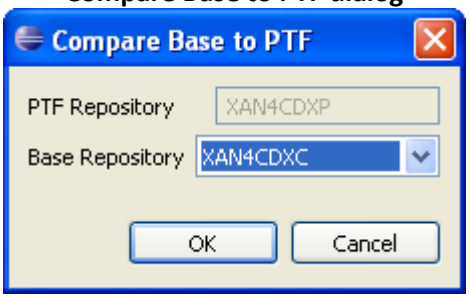
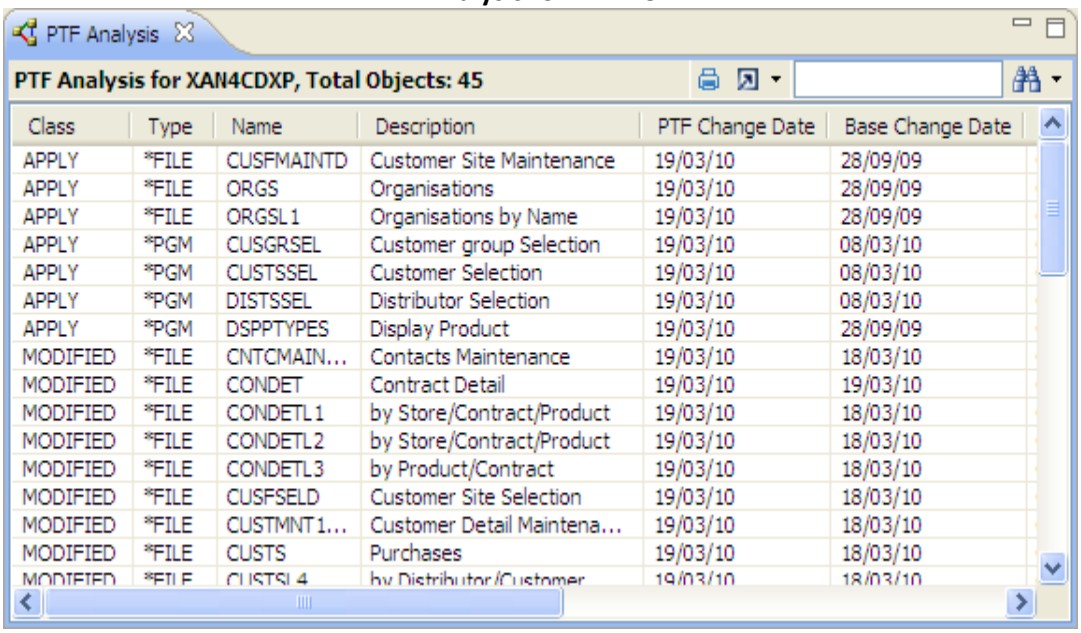
Compare Base to PTF dialog



5. The final step is to display the PTF Analysis data. Opt for the context menu on new X-Analysis application – **XAN4CDXP**, and then select the **PTF Analysis** option from the **Inter-Repository Options** submenu. The following screen should appear:

PTF Analysis for XAN4CDXP



Class	Type	Name	Description	PTF Change Date	Base Change Date
APPLY	*FILE	CUSFMAINTD	Customer Site Maintenance	19/03/10	28/09/09
APPLY	*FILE	ORGS	Organisations	19/03/10	28/09/09
APPLY	*FILE	ORGSL1	Organisations by Name	19/03/10	28/09/09
APPLY	*PGM	CUSGRSEL	Customer group Selection	19/03/10	08/03/10
APPLY	*PGM	CUSTSSEL	Customer Selection	19/03/10	08/03/10
APPLY	*PGM	DISTSSEL	Distributor Selection	19/03/10	08/03/10
APPLY	*PGM	DSPPTYPES	Display Product	19/03/10	28/09/09
MODIFIED	*FILE	CNTCMAIN...	Contacts Maintenance	19/03/10	18/03/10
MODIFIED	*FILE	CONDET	Contract Detail	19/03/10	19/03/10
MODIFIED	*FILE	CONDETL1	by Store/Contract/Product	19/03/10	18/03/10
MODIFIED	*FILE	CONDETL2	by Store/Contract/Product	19/03/10	18/03/10
MODIFIED	*FILE	CONDETL3	by Product/Contract	19/03/10	18/03/10
MODIFIED	*FILE	CUSFSELD	Customer Site Selection	19/03/10	18/03/10
MODIFIED	*FILE	CUSTMNT1...	Customer Detail Maintena...	19/03/10	18/03/10
MODIFIED	*FILE	CUSTS	Purchases	19/03/10	18/03/10
MODIFIED	*FILE	CUSTSL4	by Distributor/Customer	19/03/10	18/03/10

The first column of the PTF Analysis displays Class. The Class column can have any of the following entries:

MODIFIED = The object from the PTF library was found in one of the CUSTOMISED libraries.
User Action: The PTF object will have to be reviewed and changes applied in the CUSTOMISED library; manually applied to the object in the PTF library.

NEW = The object from the PTF library was not found in the base repository.
User Action: The PTF object can be placed in the base library.

APPLY = The object from the PTF library was found in one of the BASE libraries (Vanilla) but not in any of the CUSTOMISED libraries.
User Action: The PTF object can overlay the object in the base library.

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REFERS = The object from the PTF library refers to one or more objects in one of the CUSTOMISED libraries. The details are in XPTFROBJ.
User Action: The PTF object will have to be revised to make sure all customised objects referred to still meet the requirements of this object.

REFERENCED = The object from the PTF library is referenced by an object in one of the CUSTOMISED libraries. The details are in XPTFROBJ.
User Action: The CUSTOMISED objects will have to be reviewed to make sure the PTF object still meets the requirements of that object.

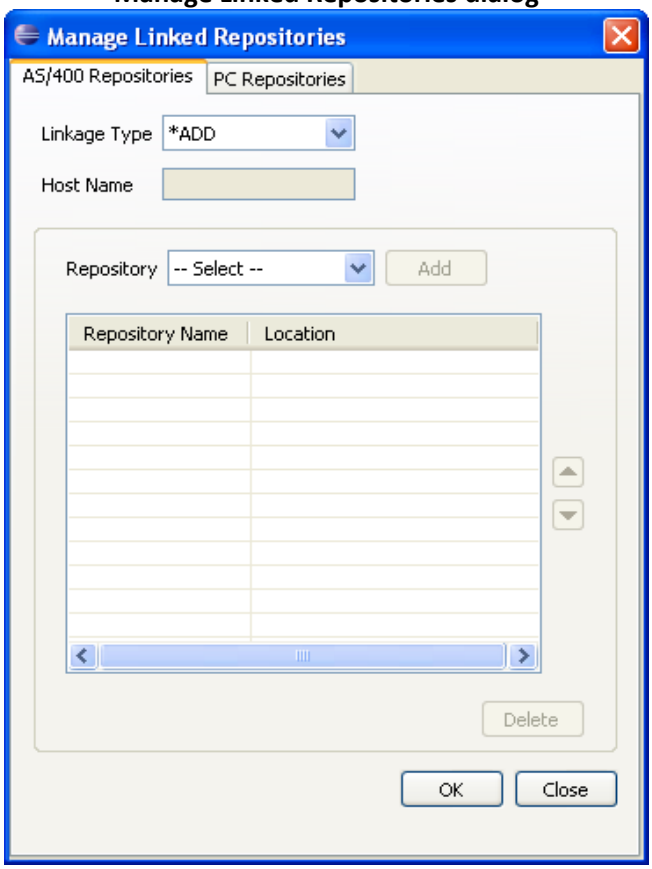
MANAGE LINKED REPOSITORIES

If you want to link one or more IBM i and/or non-IBM i (Windows) cross-reference repository to an existing IBM i repository, select the **Manage Linked Repositories** option. The option is available under **Inter-Repository Options**. You can use this option to manage the linked repositories.

Linking IBM i Repositories

The **Manage Linked Repositories** option opens the following dialog:

Manage Linked Repositories dialog



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In the above dialog, **Host Name** is the field that will show the IP address of the AS/400 server whose repositories can be selected from the Repository Combo.

Add the repository (ies) on to the base (working) repository for combined analysis. The dialog lists all repositories available on the X-Analysis server, besides the base repository. You can select the repository to add.

Linkage Type: Link repository (ies) in the following two ways:

- ***ADD** – In this mode, the cross-reference information from the entire linked repository (ies) is merged with those of the base repository on the X-Analysis lists and diagrams.
- ***REPLACE** – Here, ONLY the distinct cross-reference information from the repository (ies) is put on the X-Analysis lists/diagrams. This depends on the sequence of the repositories.

Repository: It lists all the X-Analysis repositories on the machine, besides the one working with. Select a repository to link with the base repository.

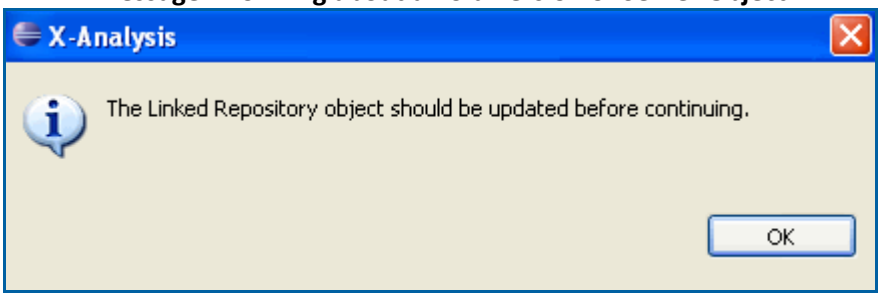
To link a repository, select the desired repository from Repository drop-down and click **Add**. This adds the selected repository to the linked repository list.

To delete the repository from linked repository list, select the repository and click **Delete**. This removes the selected repository from the linked repository list. The base repository, shown in blue, cannot be removed from the list.

Use the arrow buttons to change the sequence of the linked repositories.

Old Linked Repository Object – When the old users of X-Analysis select the **Manage Linked Repositories** option, they see the following information message:

Message informing about an old version of Server Object

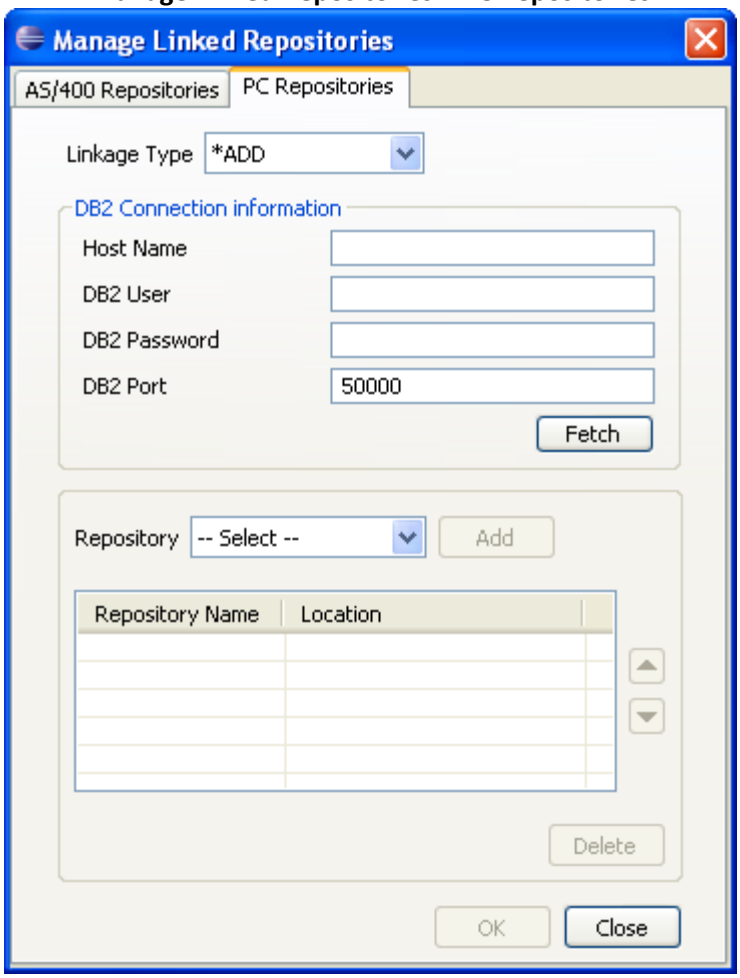


In case you receive this message, then request Fresche Legacy for the updated Server Component(s).

Linking Non-IBM i (PC Repositories)

Click on the **PC Repositories** tab to invoke the following window:

Manage Linked Repositories – PC Repositories



Note that in the above window, besides the DB2 Connection information group, all the other information will remain the same as specified for Linking IBM i Repositories (AS/400 Repositories).

The **DB2 Connection information** group is described as follows:

Host Name: Host Name is the name or IP address of the machine with which the DB2 connection is required.

DB2 User: Specify the DB2 user that uniquely identifies the DB2 user of the system and allows access to DB2 tools/services.

Password: Specify the password that is used for DB2 authentication, to prove identity or gain access to a DB2 resource.

DB2 Port: Specify the port number for the default DB2 instance where DB2 services must be running (Default DB2 port is 50000).

Fetch: After the DB2 information is supplied, click **Fetch** to populate the Repository Combo. Once this action is performed, you can select the repository to add.

Audit Options

These options simplify the auditing processes for you by providing effective means to measure, monitor, and manage changes and complexity to applications. **Audit Options** are available on the context menu over the cross-reference library and application areas.

The following options constitute **Audit Options**:

- Metrics Analysis
- Screen Metrics
- File Metrics
- Business Process Logic Metrics
- Specialized Analysis
- Problem Analysis
- Object Allocation
- Database Summary
- Summary Report
- Initialize Source Archiving
- Generate Metrics Analysis
- Edit Problem Categories
- Generate Problem Analysis

METRICS ANALYSIS

Metrics Analysis is the first option under **Audit Options**. The **Metrics Analysis** option provides low, medium, and high complexity classification of each program based on the following attributes of the program:

- Source Type
- Source Lines
- Cyclomatic Complexity

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- Halstead
- Maintainability Index
- Files
- Device files comprising Display Files and Printer Files
- Called Programs
- Calling Programs

The Metrics information is displayed under the following headings:

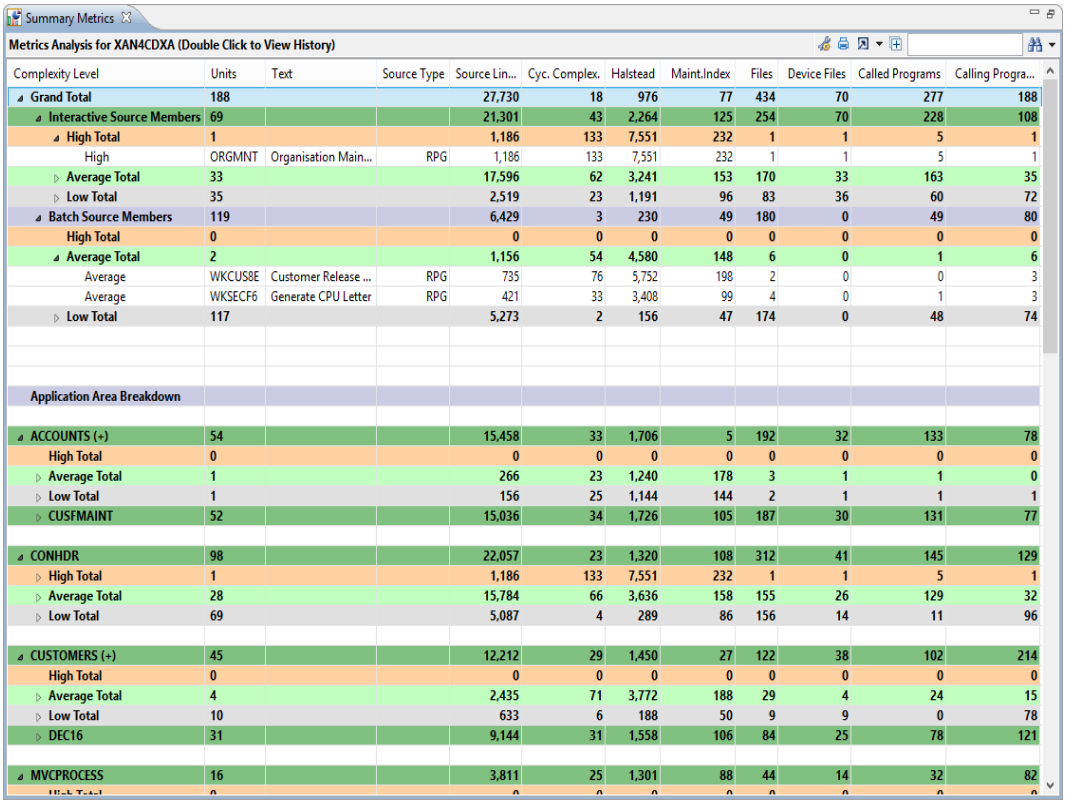
- Batch Programs
- Interactive Programs

These two highest levels are then further sub-categorised as High, Average, and Low.

The user-specified values determine where a program fits into these sub-categories. By default, these Preferences are blank, so all programs are listed under 'Low' complexity, until values have been set using the Metrics Preferences, discussed below.

The following screen displays the Metrics information for the cross-reference library, **XAN4CDXA**:

Metrics information for XAN4CDXA



Summary Metrics

Metrics Analysis for XAN4CDXA (Double Click to View History)

Complexity Level	Units	Text	Source Type	Source Lin...	Cyc. Complex.	Halstead	Maint.Index	Files	Device Files	Called Programs	Calling Progra...
Grand Total	188			27,730	18	976	77	434	70	277	188
Interactive Source Members	69			21,301	43	2,264	125	254	70	228	108
High Total	1			1,186	133	7,551	232	1	1	5	1
High	ORGMNT	Organisation Main...	RPG	1,186	133	7,551	232	1	1	5	1
Average Total	33			17,596	62	3,241	153	170	33	163	35
Low Total	35			2,519	23	1,191	96	83	36	60	72
Batch Source Members	119			6,429	3	230	49	180	0	49	80
High Total	0			0	0	0	0	0	0	0	0
Average Total	2			1,156	54	4,580	148	6	0	1	6
Average	WKCUS8E	Customer Release ...	RPG	735	76	5,752	198	2	0	0	3
Average	WKSECF6	Generate CPU Letter	RPG	421	33	3,408	99	4	0	1	3
Low Total	117			5,273	2	156	47	174	0	48	74
Application Area Breakdown											
ACCOUNTS (+)	54			15,458	33	1,706	5	192	32	133	78
High Total	0			0	0	0	0	0	0	0	0
Average Total	1			266	23	1,240	178	3	1	1	0
Low Total	1			156	25	1,144	144	2	1	1	1
CUSFMAINT	52			15,036	34	1,726	105	187	30	131	77
CONHDR	98			22,057	23	1,320	108	312	41	145	129
High Total	1			1,186	133	7,551	232	1	1	5	1
Average Total	28			15,784	66	3,636	158	155	26	129	32
Low Total	69			5,087	4	289	86	156	14	11	96
CUSTOMERS (+)	45			12,212	29	1,450	27	122	38	102	214
High Total	0			0	0	0	0	0	0	0	0
Average Total	4			2,435	71	3,772	188	29	4	24	15
Low Total	10			633	6	188	50	9	9	0	78
DEC16	31			9,144	31	1,558	106	84	25	78	121
MVCPROCESS	16			3,811	25	1,301	88	44	14	32	82

The Metrics information displayed above has the following columns:

1. **Complexity Level:** For each attribute 1 - 6, you will allocate weights, e.g. each file usage = 1, each Copybooks usage = 4, etc. The sum total of these per program will be calculated and the Complexity level for the program worked out. E.g. Points <10 - LOW, 10-20 - AVERAGE, >20 - HIGH. You can allocate weights in the **General Metrics Preferences** dialog.

2. **Units:** When collapsed, it displays the total number of programs. When expanded, it displays the names of the programs.

3. **Text:** Displays the description of the object.

4. **Source Type:** Informs about the type of source.

5. **Source Lines:** Total number of Source Lines in a source member.

6. **Cyclomatic Complexity:** Measures amount of decision logic in a program. Shows total number of conditional statements used.

7. **Halstead:** Displays program's complexity directly from source code based upon the operators and operands used.

8. **Maintainability Index:** The maintainability index is calculated with certain formulae from lines-of-code measures, Cyclomatic Complexity and Halstead complexity measures.

9. **Files:** Total number of Files used by the source member.

10. **Device Files:** Total number of Display and Printer Files used by the source member.

11. **Called Programs:** Total number of called programs from the source member.

12. **Calling Programs:** Total number of calling programs from the source member.

Note: The Cyclomatic Complexity, Halstead, and Maintainability Index columns in the Metrics window display the average count. This can be seen in both the Group Total and the Grand Total.

The conventions that are used for processing Cyclomatic Complexity, Halstead and Maintainability Index are given below:

Cyclomatic Complexity – This is simply a count of the number of decision points and exit points in a module. In RPG, this would be a count for each subroutine or procedure (plus mainline) of how many statements have these operation codes:

- IFxx
- ELSEIF
- DOW
- DOU
- CABxx
- WHxx
- CASxx
- FOR

Halstead measures – These are five different measurements based on formulas applied to four different values obtained from the code, again, for each subroutine:

n1 – the number of different op codes in the subroutine
n2 – the number of different variables (or files) used on all statements in the subroutine
N1 – the total number of op codes used in the subroutine (some may be used multiple times)
N2 – the total number of all instances of variables in the subroutines

From these four numbers different measurements are calculated:

Module length = N1 + N2
Module vocabulary = n1 + n2
Halstead Volume = N * log(2)n
Difficulty = (n1/2) * (N2/n2)
Effort = Volume * Difficulty

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Maintainability Index – This is a formula based on some years of experience of Hewlett-Packard engineers. The lower the number, the less maintainable the code will be. This is also at the subroutine level. It uses four numbers as input:

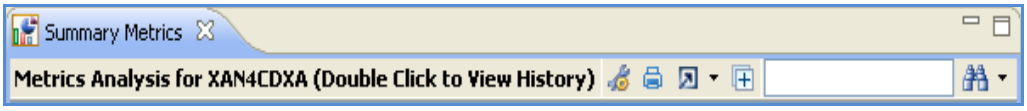
HV – Halstead volume from above
CC – Cyclomatic Complexity from above
LOC – Lines of actual code in the subroutine
COM – Lines of non-blank comments in the subroutine (beginning after the previous ENDSR)

MI = 5.2*naturallog (HV) – 0.23*CC – 16.2naturallog (LOC) + 50.0*sin (square root (2.46*COM))

Metrics Toolbar

The Metrics toolbar comprises various options which are discussed below.

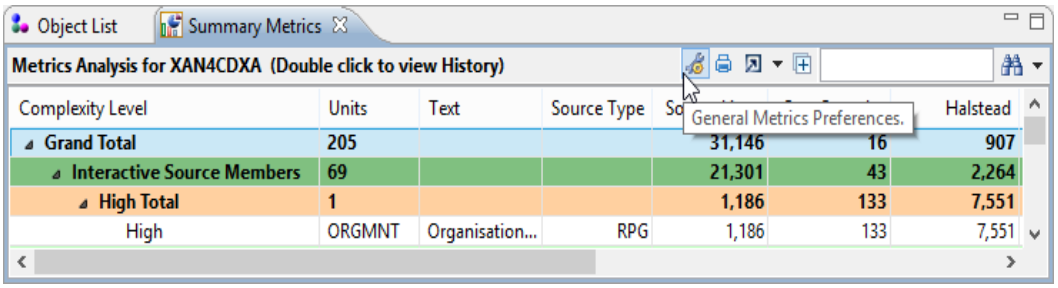
Toolbar available on Metrics Window



Metrics Preferences

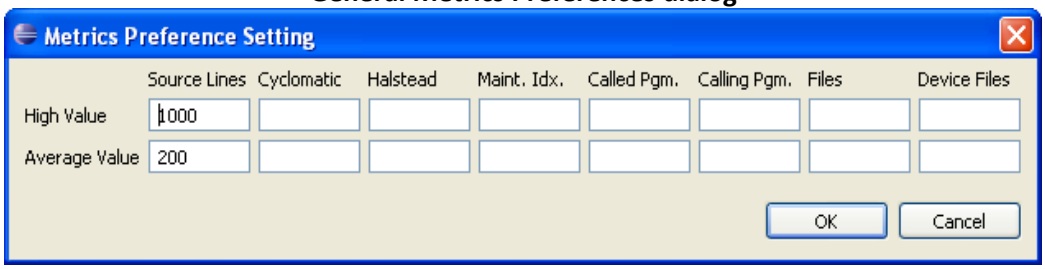
You can set the Metrics Preferences as per your requirements.

General Metrics Preferences icon on Metrics Window Toolbar



Click the **General Metrics Preferences** icon to invoke the following dialog:

General Metrics Preferences dialog



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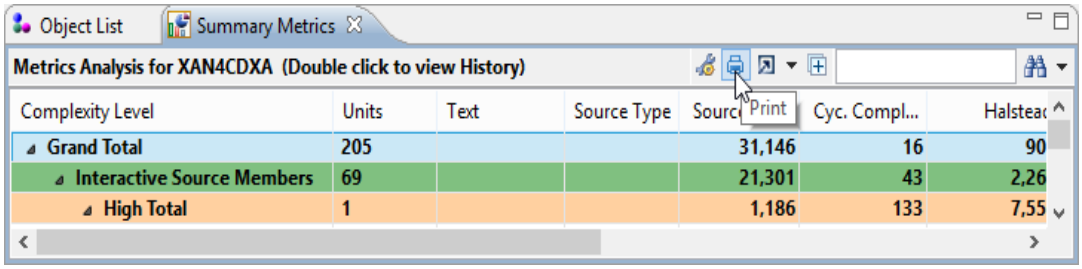
Specify a high value so that any value above this will determine that the program is of high complexity. Any program that falls below the Average setting will be determined as Low complexity.

Print Metrics

To print the Metrics directly, select **Print**.

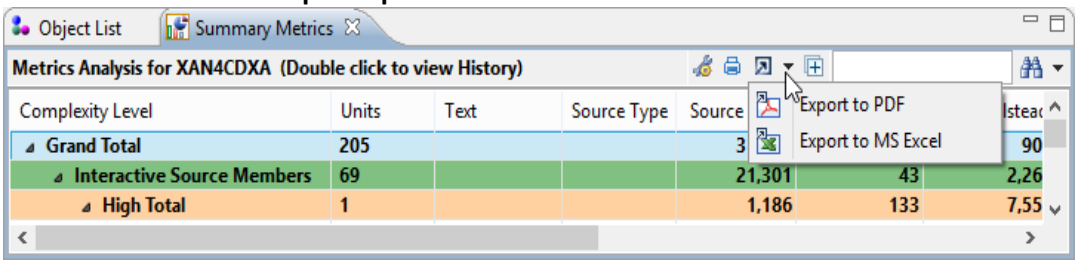
Print icon on Metrics Window Toolbar



Export Metrics

Select the **PDF** or **MS Excel** option as required under the **Export Options** icon.

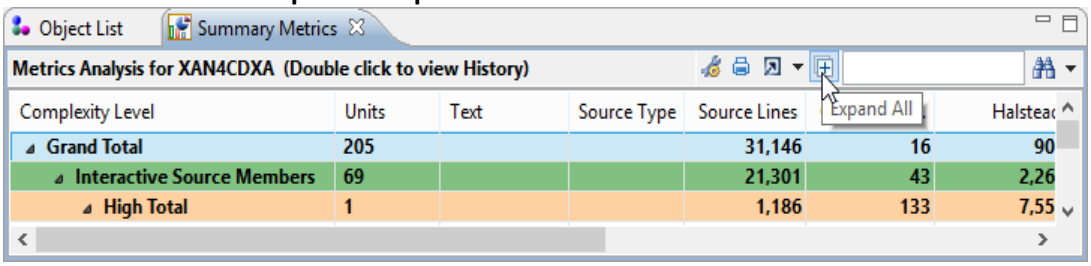
Export Options on Metrics Window Toolbar



Expand All

Click the **Expand All** icon which will expand all the data.

Expand All option on Metrics Window Toolbar



The screen below shows the expanded window after the **Expand All** icon is clicked:

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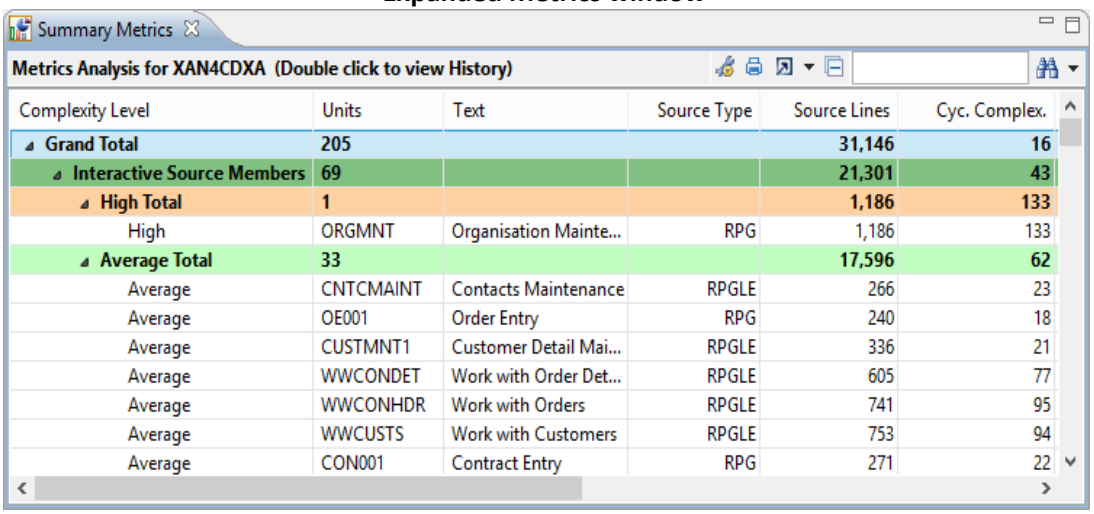
Expanded Metrics window



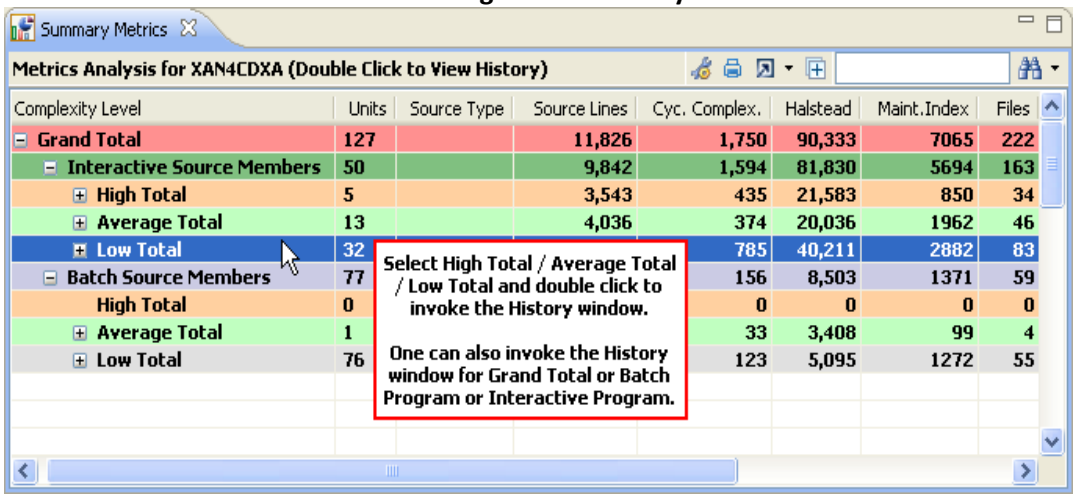
Complexity Level	Units	Text	Source Type	Source Lines	Cyc. Complex.
Grand Total	205			31,146	16
Interactive Source Members	69			21,301	43
High Total	1			1,186	133
High	ORGMNT	Organisation Mainte...	RPG	1,186	133
Average Total	33			17,596	62
Average	CNTCMAINT	Contacts Maintenance	RPGLE	266	23
Average	OE001	Order Entry	RPG	240	18
Average	CUSTMNT1	Customer Detail Mai...	RPGLE	336	21
Average	WWCONDET	Work with Order Det...	RPGLE	605	77
Average	WWCONHDR	Work with Orders	RPGLE	741	95
Average	WWCUSTS	Work with Customers	RPGLE	753	94
Average	CON001	Contract Entry	RPG	271	22

Metrics History

The Metrics History displays all previous instances of the generated metrics data. The Metrics History data will be available only when the Metrics data is generated more than once.

The Metrics History can be generated for all individual levels – High, Average & Low Totals for Batch Programs or Interactive Programs and for the Grand Total also.

Invoking Metrics History


Summary Metrics
Metrics Analysis for XAN4CDXA (Double Click to View History)
Select High Total / Average Total / Low Total and double click to invoke the History window.
One can also invoke the History window for Grand Total or Batch Program or Interactive Program.

Complexity Level	Units	Source Type	Source Lines	Cyc. Complex.	Halstead	Maint.Index	Files
Grand Total	127		11,826	1,750	90,333	7065	222
Interactive Source Members	50		9,842	1,594	81,830	5694	163
High Total	5		3,543	435	21,583	850	34
Average Total	13		4,036	374	20,036	1962	46
Low Total	32			785	40,211	2882	83
Batch Source Members	77			156	8,503	1371	59
High Total	0			0	0	0	0
Average Total	1			33	3,408	99	4
Low Total	76			123	5,095	1272	55

Select ‘Low Total’ row from the Metrics Window and perform double-click action to invoke the Metrics History window, as shown below:

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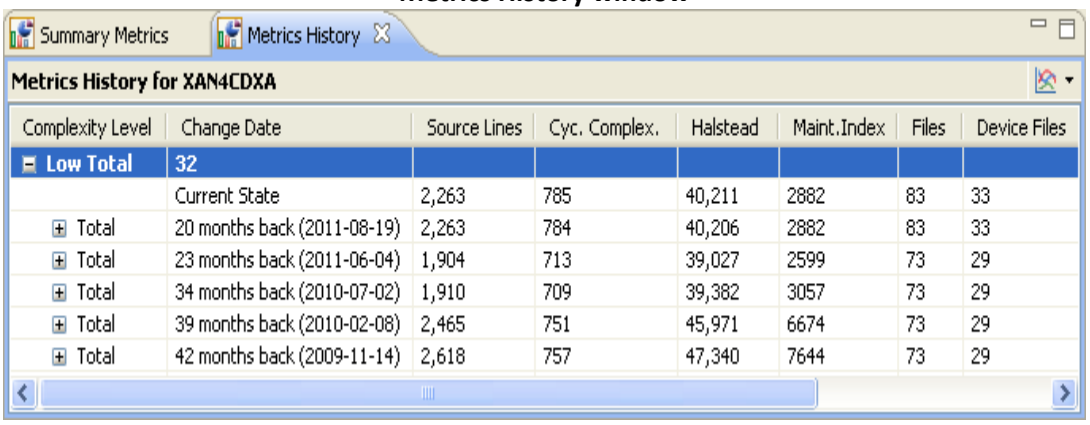
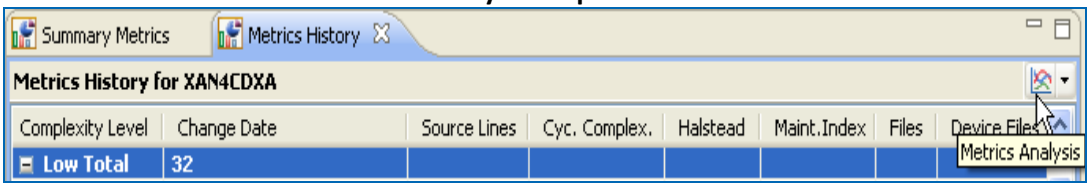
Metrics History window


Summary Metrics
Metrics History
Metrics History for XAN4CDXA
Complexity Level | Change Date | Source Lines | Cyc. Complex. | Halstead | Maint.Index | Files | Device Files
Low Total | 32
Current State | 2,263 | 785 | 40,211 | 2882 | 83 | 33
Total | 20 months back (2011-08-19) | 2,263 | 784 | 40,206 | 2882 | 83 | 33
Total | 23 months back (2011-06-04) | 1,904 | 713 | 39,027 | 2599 | 73 | 29
Total | 34 months back (2010-07-02) | 1,910 | 709 | 39,382 | 3057 | 73 | 29
Total | 39 months back (2010-02-08) | 2,465 | 751 | 45,971 | 6674 | 73 | 29
Total | 42 months back (2009-11-14) | 2,618 | 757 | 47,340 | 7644 | 73 | 29

Metrics History Chart

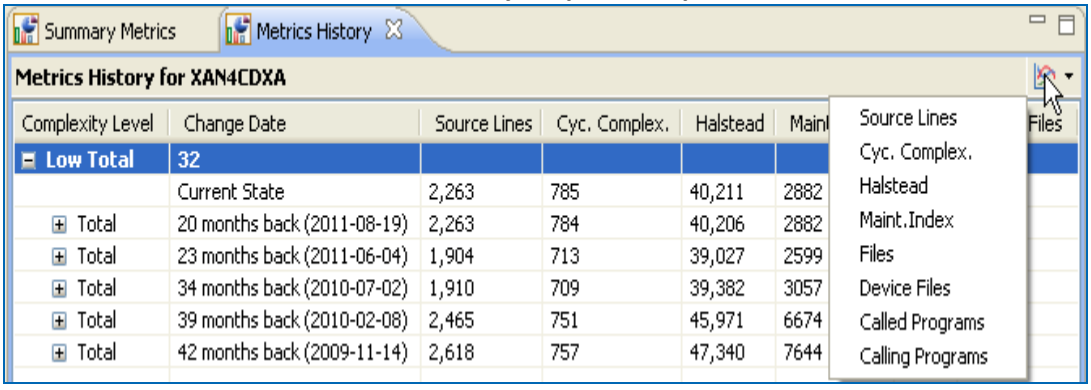
X-Analysis can also display the Metrics History in a chart form for all individual parameters. The Metrics History toolbar contains a drop-down button called Metrics Analysis:

Metrics Analysis drop-down button


Summary Metrics
Metrics History
Metrics History for XAN4CDXA
Complexity Level | Change Date | Source Lines | Cyc. Complex. | Halstead | Maint.Index | Files | Device Files
Low Total | 32
Metrics Analysis

The drop-down button contains the list of parameters against which a chart can be generated.

Metrics History drop-down options


Summary Metrics
Metrics History
Metrics History for XAN4CDXA
Complexity Level | Change Date | Source Lines | Cyc. Complex. | Halstead | Maint | Files
Low Total | 32
Current State | 2,263 | 785 | 40,211 | 2882
Total | 20 months back (2011-08-19) | 2,263 | 784 | 40,206 | 2882
Total | 23 months back (2011-06-04) | 1,904 | 713 | 39,027 | 2599
Total | 34 months back (2010-07-02) | 1,910 | 709 | 39,382 | 3057
Total | 39 months back (2010-02-08) | 2,465 | 751 | 45,971 | 6674
Total | 42 months back (2009-11-14) | 2,618 | 757 | 47,340 | 7644
Source Lines
Cyc. Complex.
Halstead
Maint.Index
Files
Device Files
Called Programs
Calling Programs

Select the **Cyc. Complex.** option from the drop-down menu:

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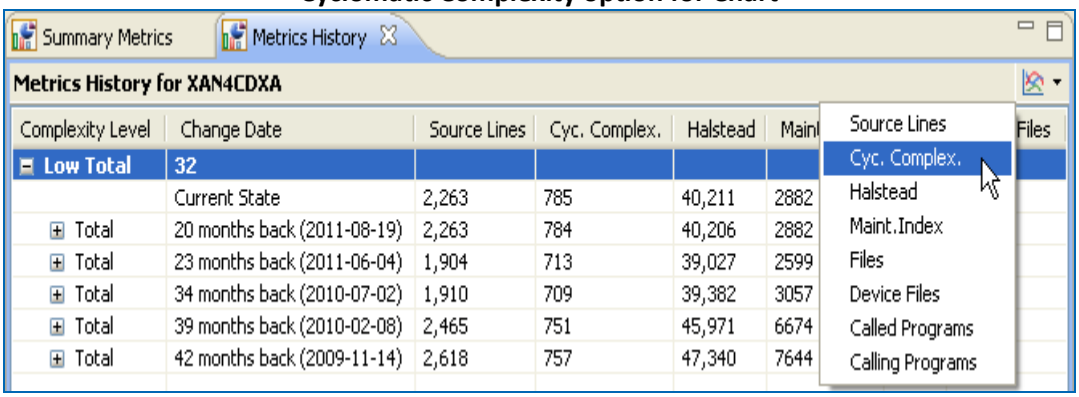
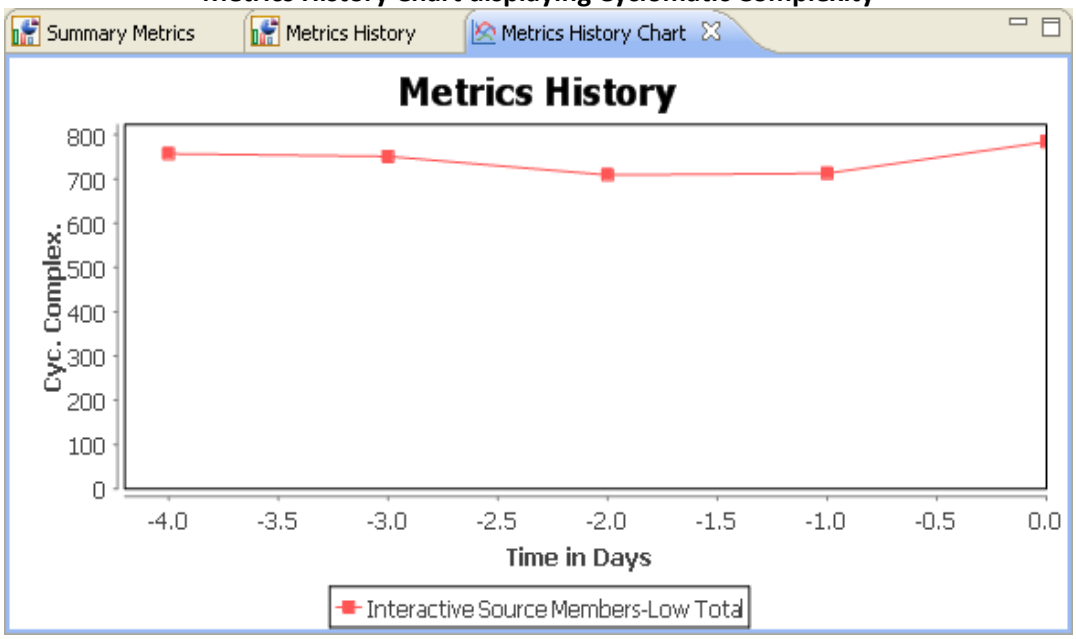
Cyclomatic Complexity option for Chart



This action invokes the Metrics History chart displaying Cyclomatic Complexity:

Metrics History Chart displaying Cyclomatic Complexity



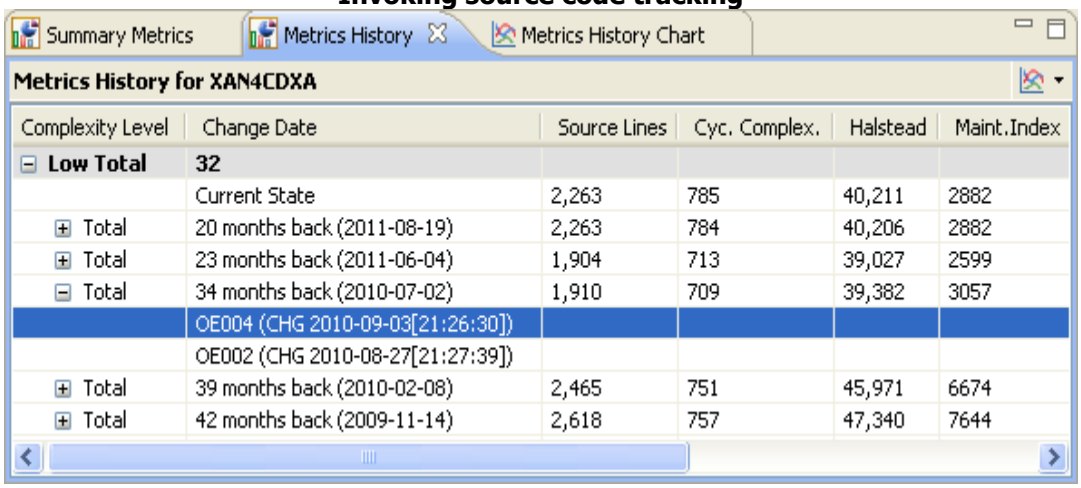
Similarly, the user can generate charts for all the other parameters.

Users can check Metrics History for all the Interactive Programs / Batch Programs and Grand Total from the Metrics window.

Source code tracking

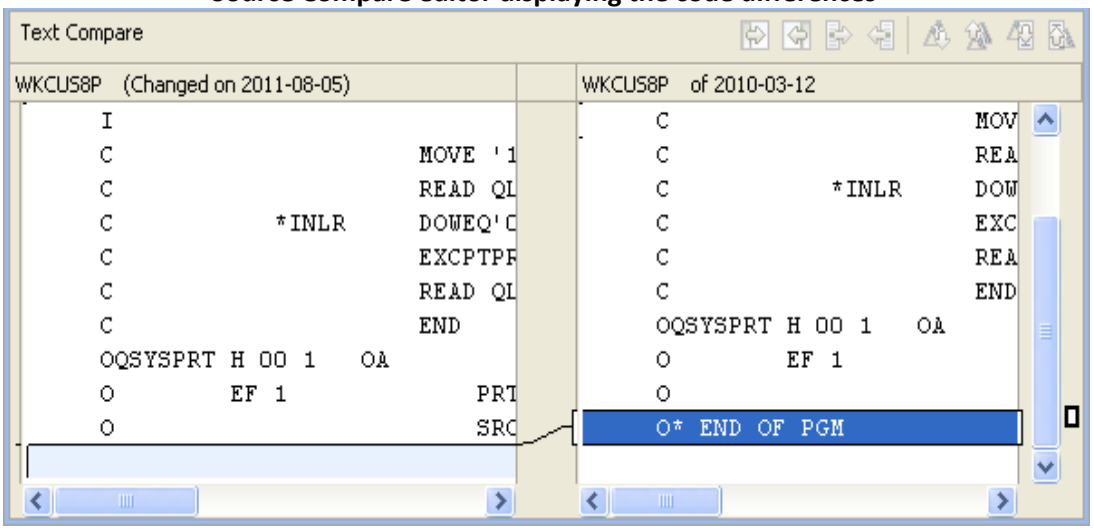
The Metrics History provides a facility to see changes in the source code. Expand the Metrics History and select a program as shown below:

Invoking source code tracking


Summary Metrics
Metrics History
Metrics History Chart
Metrics History for XAN4CDXA
Complexity Level | Change Date | Source Lines | Cyc. Complex. | Halstead | Maint.Index
Low Total | 32
Current State | 2,263 | 785 | 40,211 | 2882
Total | 20 months back (2011-08-19) | 2,263 | 784 | 40,206 | 2882
Total | 23 months back (2011-06-04) | 1,904 | 713 | 39,027 | 2599
Total | 34 months back (2010-07-02) | 1,910 | 709 | 39,382 | 3057
OE004 (CHG 2010-09-03[21:26:30])
OE002 (CHG 2010-08-27[21:27:39])
Total | 39 months back (2010-02-08) | 2,465 | 751 | 45,971 | 6674
Total | 42 months back (2009-11-14) | 2,618 | 757 | 47,340 | 7644

The Source Compare editor is invoked when a user double-clicks on the listed program, as shown below:

Source Compare editor displaying the code differences



Screen Metrics

The **Screen Metrics** option provides low, medium and high complexity classification of all the available screen functions. The screen metrics information is displayed for the complete application and for all the application areas.

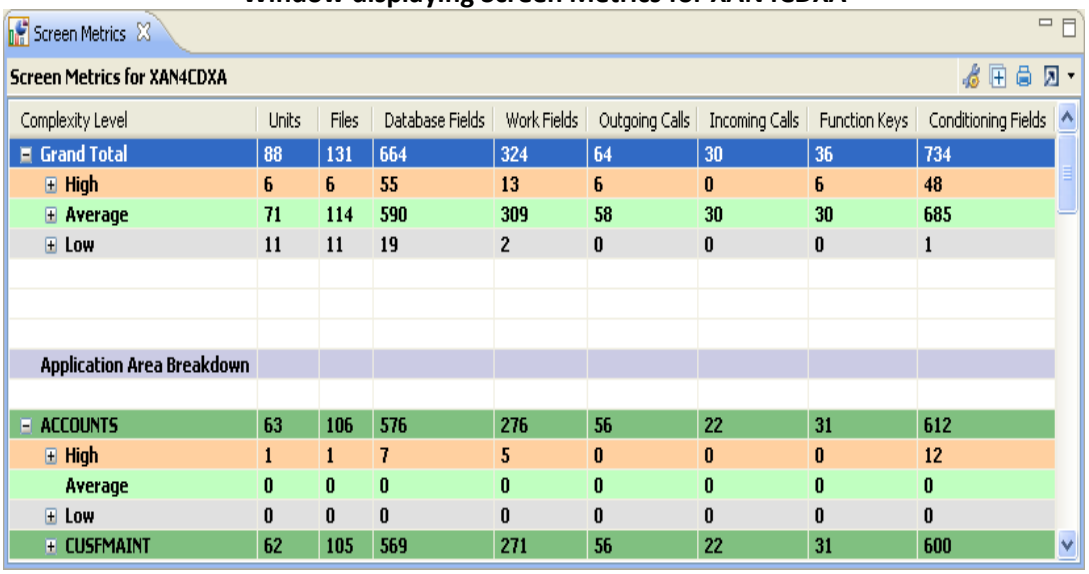
The Screen Metrics information is displayed under the following headings:

- Grid type functions
- Record type functions

- Other functions

The following screen displays the Screen Metrics information for the cross-reference library **XAN4CDXA**:

Window displaying Screen Metrics for XAN4CDXA



Complexity Level	Units	Files	Database Fields	Work Fields	Outgoing Calls	Incoming Calls	Function Keys	Conditioning Fields
Grand Total	88	131	664	324	64	30	36	734
High	6	6	55	13	6	0	6	48
Average	71	114	590	309	58	30	30	685
Low	11	11	19	2	0	0	0	1
Application Area Breakdown								
ACCOUNTS	63	106	576	276	56	22	31	612
High	1	1	7	5	0	0	0	12
Average	0	0	0	0	0	0	0	0
Low	0	0	0	0	0	0	0	0
CUSFMAINT	62	105	569	271	56	22	31	600

The Metrics information displayed above has the following columns:

1. **Complexity Level:** This shows various groups. The topmost group is either Grand Total, or App area totals. All functions in application areas or cross-reference application are then grouped based on complexity and then, on type of function
2. **Units:** Shows the number of functions in the group
3. **Files:** Total number of Files used by screen function
4. **Database Fields:** Total number of screen fields which are read from database fields
5. **Work Fields:** Total number of work fields in the group
6. **Outgoing Calls:** Number of functions called by this function
7. **Incoming Calls:** Number of functions calling this function
8. **Function Keys:** Total number of Function key-based actions called by functions in this group
9. **Conditioning Fields:** Number of fields on which there is a conditioning logic.

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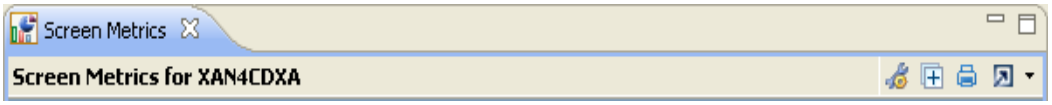
Screen Metrics toolbar

The Screen Metrics toolbar comprises various options, which are discussed below:

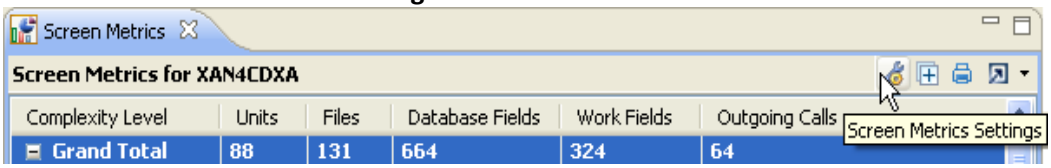
Toolbar available on Screen Metrics window



Screen Metrics Settings

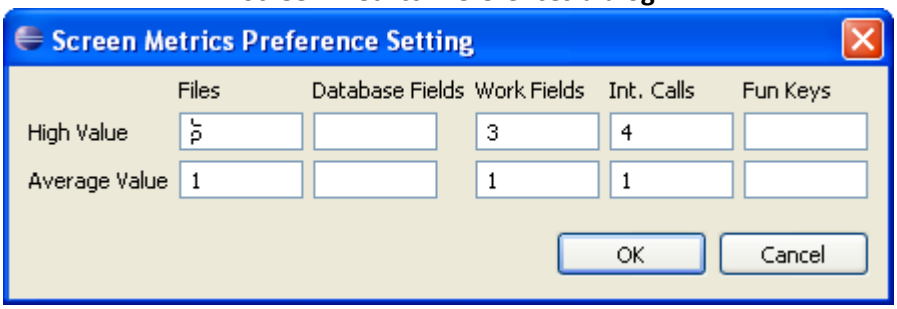
The user can set the Screen Metrics settings as per the requirements.

Screen Metrics Settings button on the Screen Metrics Toolbar



Click **Screen Metrics Settings** to invoke the associated dialog:

Screen Metrics Preferences dialog

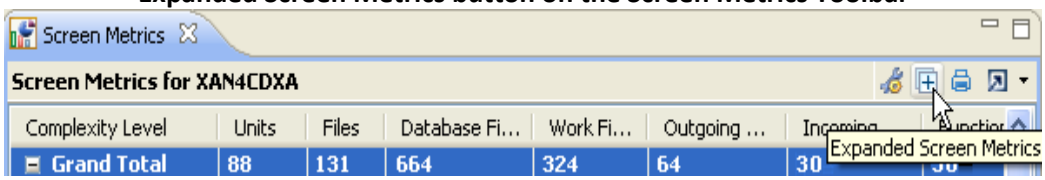


The user can set the criteria for High / Average using the above dialog.

Expand All Screen Metrics Data

Click **Expanded Screen Metrics** icon which will expand all the data.

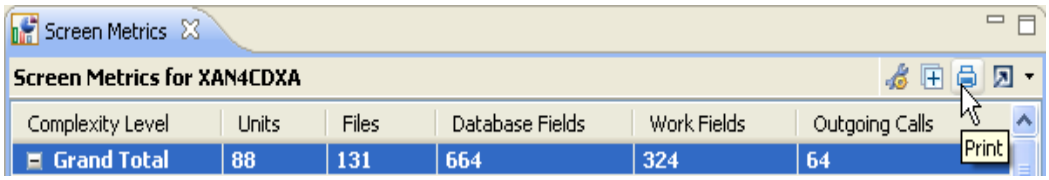
Expanded Screen Metrics button on the Screen Metrics Toolbar



Print Screen Metrics

To print the Screen Metrics information, click the **Print** icon available on the toolbar.

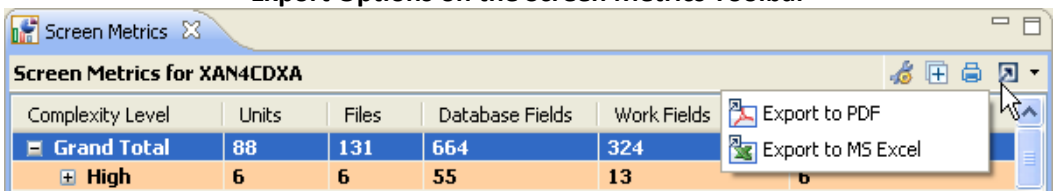
Print button on the Screen Metrics Toolbar



Export Screen Metrics

Select the **PDF** or **MS Excel** option, as required under the **Export Options** icon.

Export Options on the Screen Metrics Toolbar



FILE METRICS

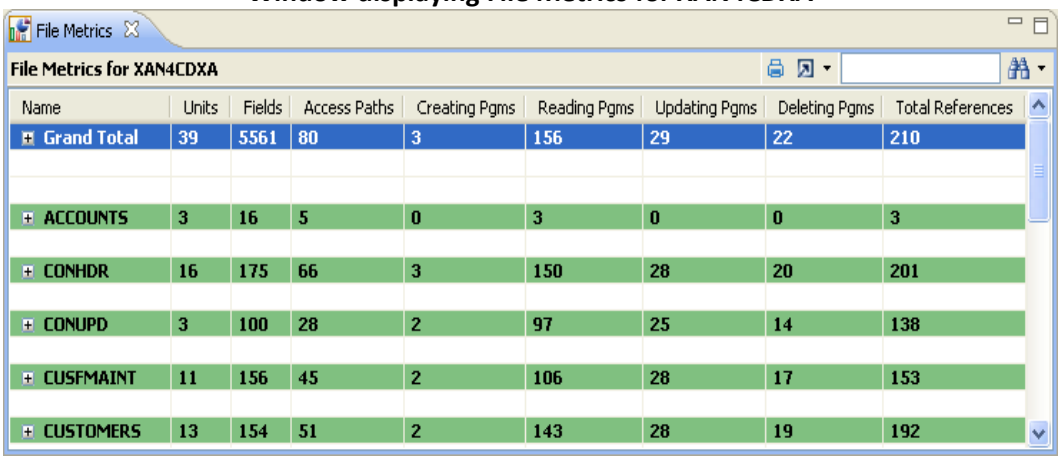
The **File Metrics** option displays various metrics on all the files. The file metrics information is displayed for the complete application and for all the application areas.

The File Metrics displays information under the following headings:

1. **Units:** Displays total number of Files.
2. **Fields:** Displays the total number of fields available in the file.
3. **Access Paths:** The total number of access paths for the file.
4. **Creating Programs:** The number of programs creating records in this file.
5. **Reading Programs:** The number of programs reading this file.
6. **Updating Programs:** The number of programs updating records in this file.
7. **Deleting Programs:** The number of programs deleting records from this file.
8. **Total References:** The total numbers of programs referencing this file (in effect total of 3 - 6).

The following screen displays the File Metrics information for the cross-reference library, **XAN4CDXA**:

Window displaying File Metrics for XAN4CDXA



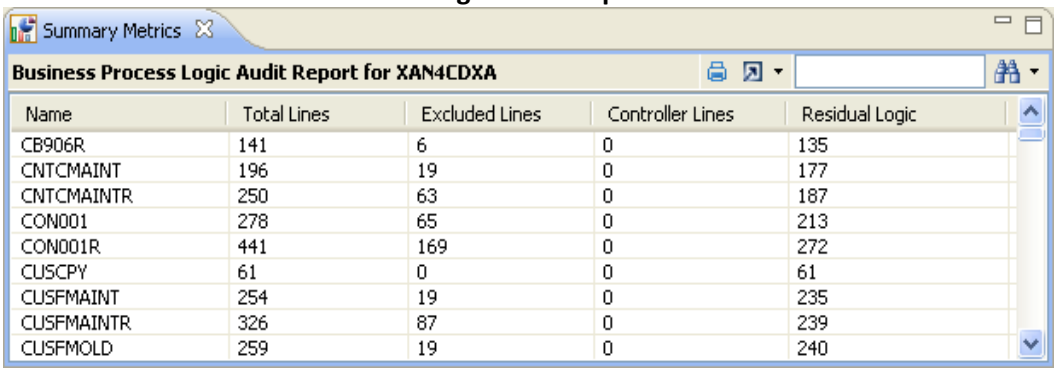
Name	Units	Fields	Access Paths	Creating Pgms	Reading Pgms	Updating Pgms	Deleting Pgms	Total References
Grand Total	39	5561	80	3	156	29	22	210
ACCOUNTS	3	16	5	0	3	0	0	3
CONHDR	16	175	66	3	150	28	20	201
CONUPD	3	100	28	2	97	25	14	138
CUSFMAINT	11	156	45	2	106	28	17	153
CUSTOMERS	13	154	51	2	143	28	19	192

Business Process Logic Metrics

The Business Process Logic Metrics Report displays business process logic data in metrics form – Total Lines, Excluded Lines, Controller Lines, and Residual Logic.

The following screen displays the Business Process Logic Metrics Report for **XAN4CDXA**:

Business Process Logic Audit Report for XAN4CDXA



Name	Total Lines	Excluded Lines	Controller Lines	Residual Logic
CB906R	141	6	0	135
CNTCMAINT	196	19	0	177
CNTCMAINTR	250	63	0	187
CON001	278	65	0	213
CON001R	441	169	0	272
CUSCPY	61	0	0	61
CUSFMAINT	254	19	0	235
CUSFMAINTR	326	87	0	239
CUSFMOLD	259	19	0	240

Specialized Analysis

The **Specialized Analysis** option allows users to design their own reports using the full metrics database in the defined system repository (the summary metrics described in the previous section uses a subset of this database). This reporting provides a valuable way to measure and manage the quality and complexity of a code base, either as a one-off or on an ongoing basis.

The Specialized report can be viewed in two ways:

- Static reports.
- Difference reports that show the changes in those values over a period of time.

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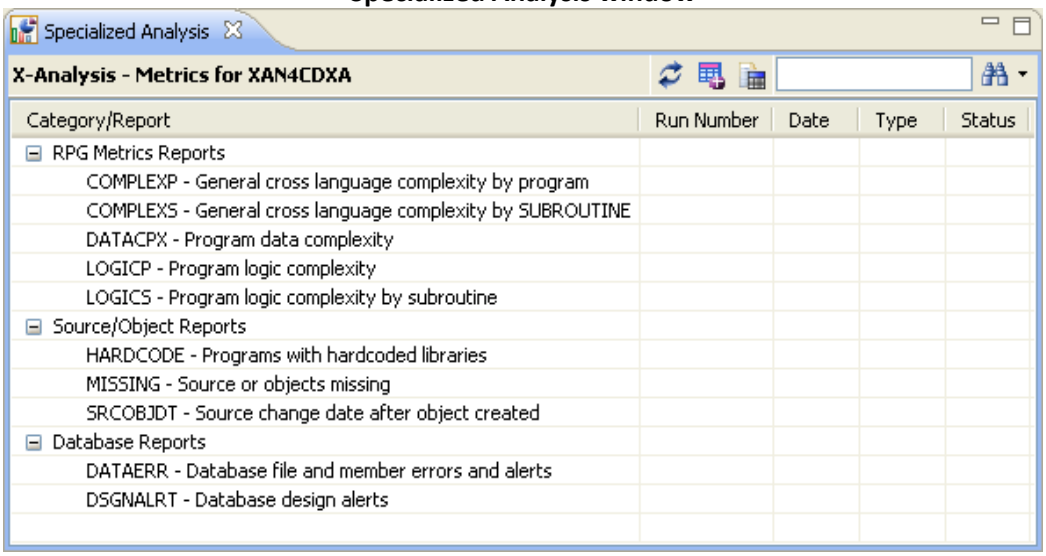
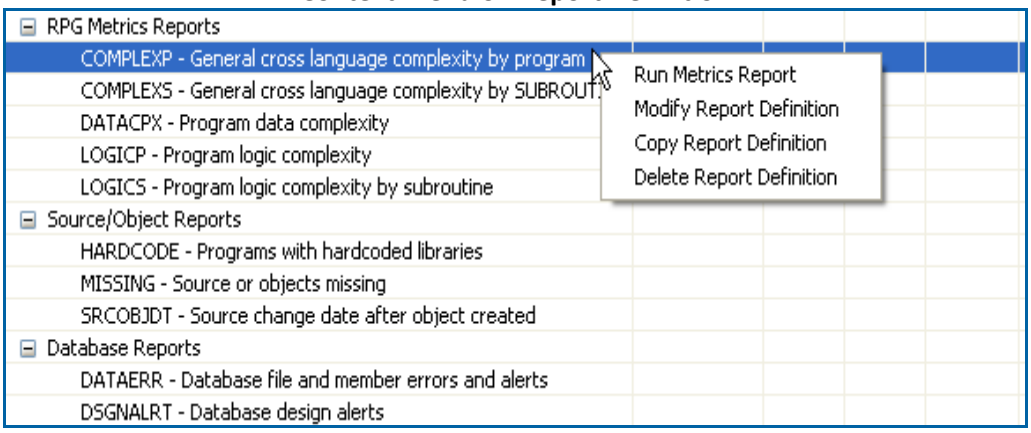
Opt for the **Specialized Analysis** option from the **Audit Options** submenu. The following screen displays the Specialized Analysis for the application library, **XAN4CDXA**:

Specialized Analysis window


Specialized Analysis
X-Analysis - Metrics for XAN4CDXA
Category/Report
Run Number
Date
Type
Status
RPG Metrics Reports
COMPLEXP - General cross language complexity by program
COMPLEXS - General cross language complexity by SUBROUTINE
DATACPX - Program data complexity
LOGICP - Program logic complexity
LOGICS - Program logic complexity by subroutine
Source/Object Reports
HARDCODE - Programs with hardcoded libraries
MISSING - Source or objects missing
SRCOBJDT - Source change date after object created
Database Reports
DATAERR - Database file and member errors and alerts
DSGNALRT - Database design alerts

The user has the option to generate pre-configured reports. Select any report under the listed category, and then right click on it to invoke the context menu:

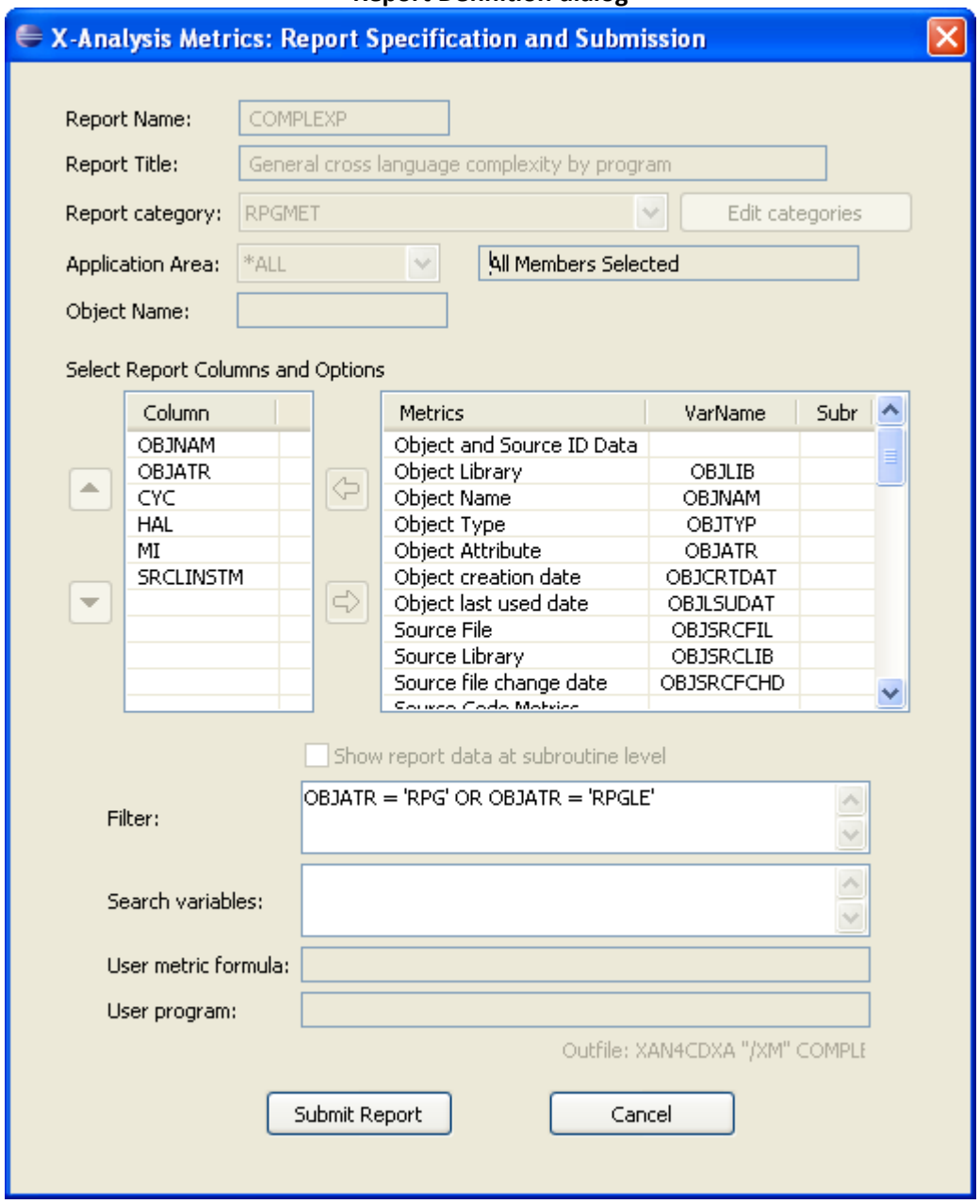
Context Menu on Report Definition


RPG Metrics Reports
COMPLEXP - General cross language complexity by program
COMPLEXS - General cross language complexity by SUBROUT
DATACPX - Program data complexity
LOGICP - Program logic complexity
LOGICS - Program logic complexity by subroutine
Source/Object Reports
HARDCODE - Programs with hardcoded libraries
MISSING - Source or objects missing
SRCOBJDT - Source change date after object created
Database Reports
DATAERR - Database file and member errors and alerts
DSGNALRT - Database design alerts
Run Metrics Report
Modify Report Definition
Copy Report Definition
Delete Report Definition

Run Metrics Report

When the user opts for this option, the pre-configured report dialog invokes:

Report Definition dialog



Click **Submit Report** to generate the report. A batch job will be invoked and upon its completion the Specialized Analysis window will be updated:

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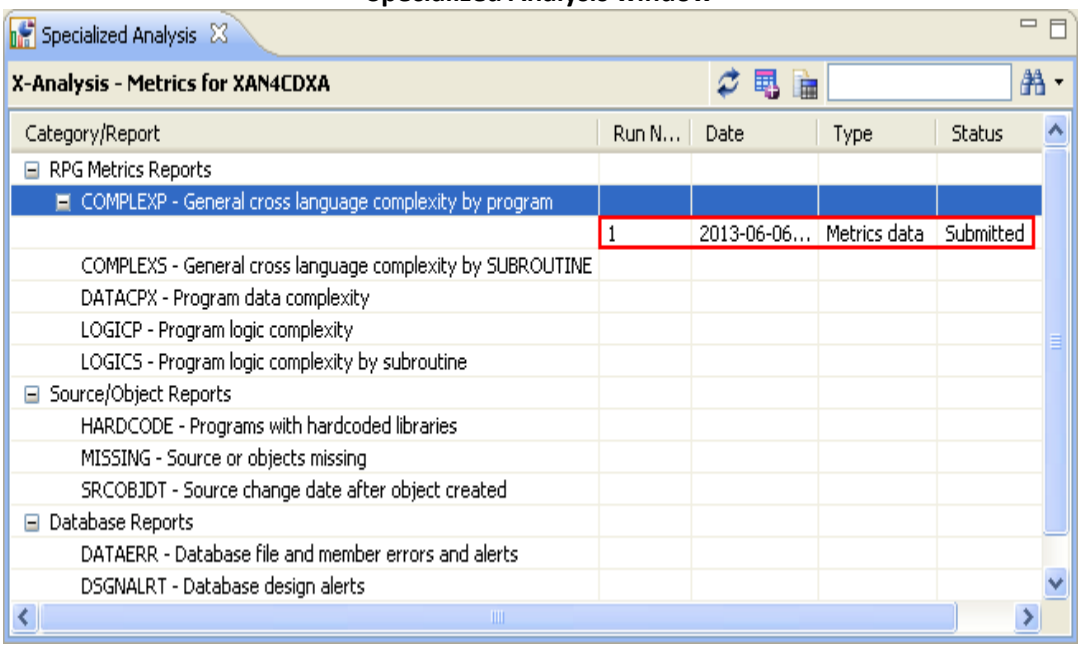
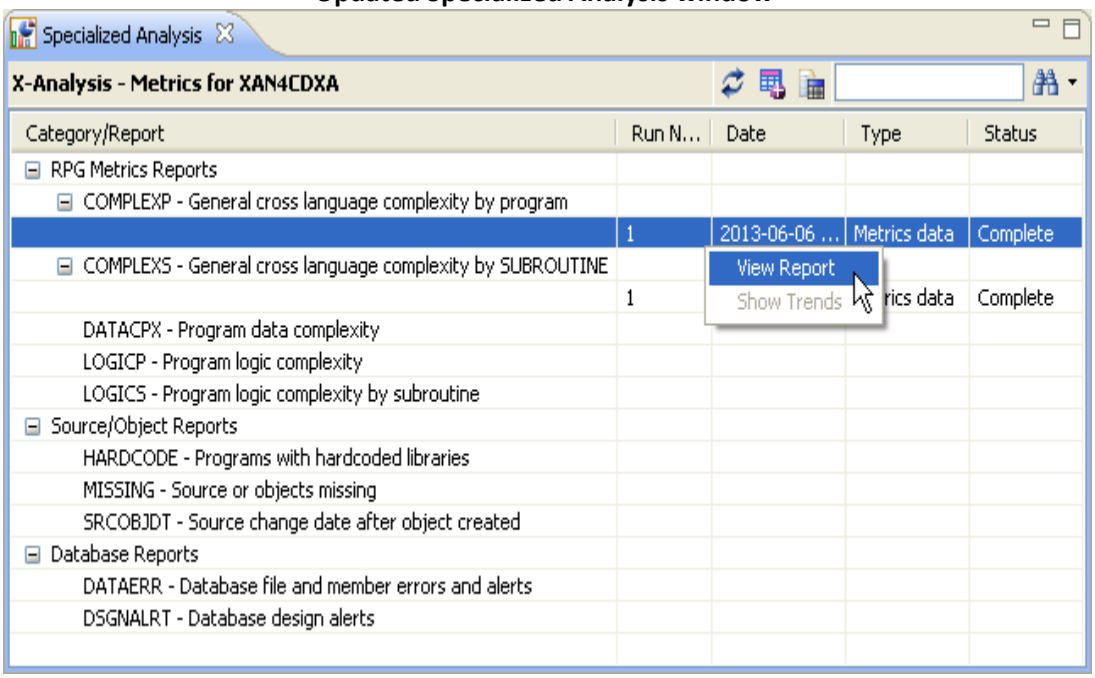
Specialized Analysis window



To view the generated report, select the report and right-click on it, which invokes the context menu. Select the **View Report** option as displayed below:

Updated Specialized Analysis window



The following similar report will be displayed. The user can export this report to MS Excel.

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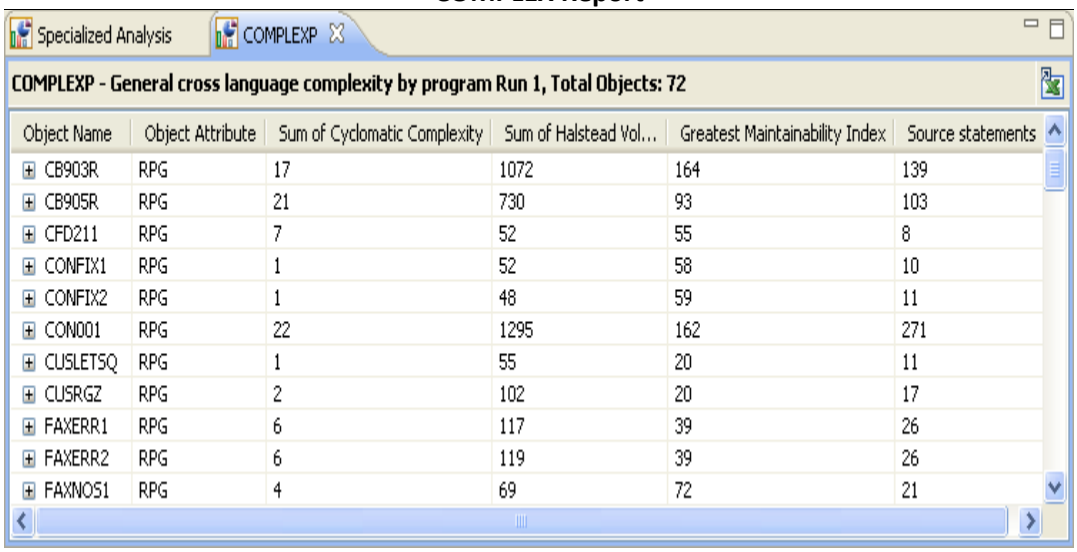
COMPLEX Report

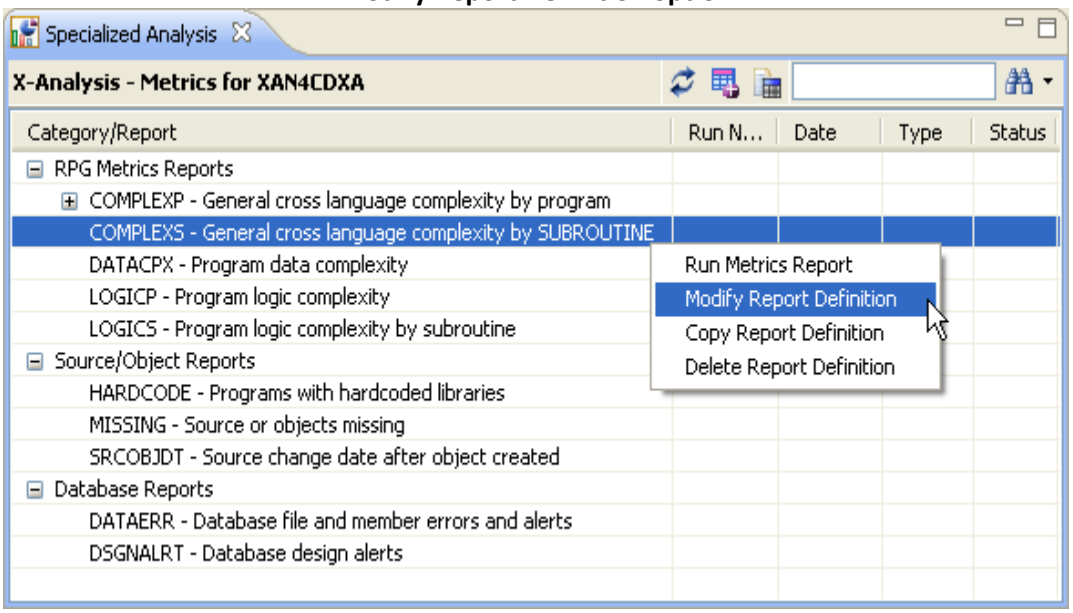


Object Name	Object Attribute	Sum of Cyclomatic Complexity	Sum of Halstead Vol...	Greatest Maintainability Index	Source statements
CB903R	RPG	17	1072	164	139
CB905R	RPG	21	730	93	103
CFD211	RPG	7	52	55	8
CONFIX1	RPG	1	52	58	10
CONFIX2	RPG	1	48	59	11
CON001	RPG	22	1295	162	271
CUSLETSQ	RPG	1	55	20	11
CUSRGZ	RPG	2	102	20	17
FAXERR1	RPG	6	117	39	26
FAXERR2	RPG	6	119	39	26
FAXNOS1	RPG	4	69	72	21

Modify Report Definition

The user has the option to modify the existing report definition.

Modify Report Definition option


Specialized Analysis
X-Analysis - Metrics for XAN4CDXA
Category/Report
Run N...
Date
Type
Status
RPG Metrics Reports
COMPLEXP - General cross language complexity by program
COMPLEXS - General cross language complexity by SUBROUTINE
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Source/Object Reports
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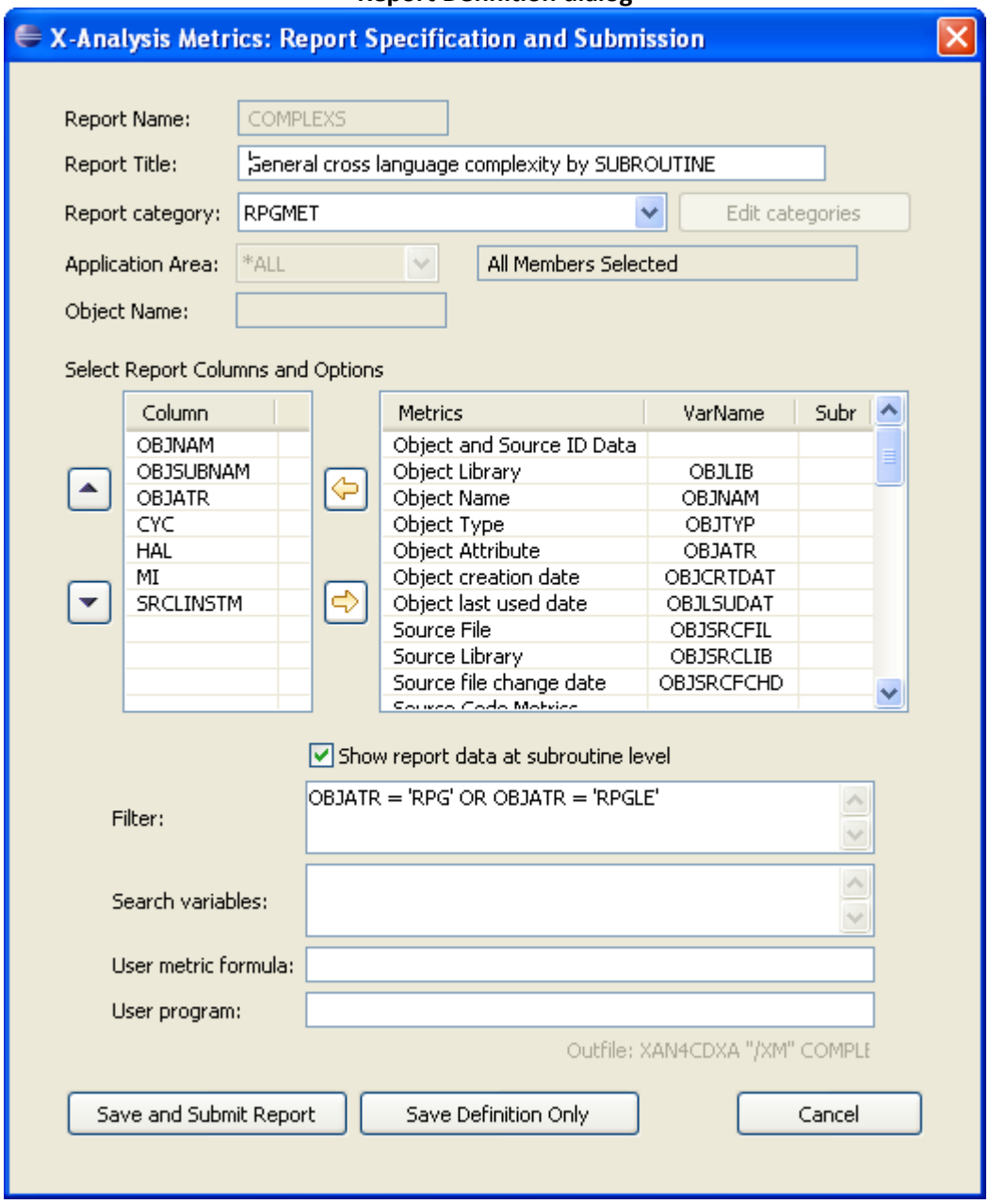
SRCOBJDT - Source change date after object created
Database Reports
DATAERR - Database file and member errors and alerts
DSGNALRT - Database design alerts
Run Metrics Report
Modify Report Definition
Copy Report Definition
Delete Report Definition

Select the **Modify Report Definition** option to invoke the report configuration dialog:

Report Definition dialog



After changing the report definition, click **Save Definition Only**. If you would like to generate the report then click **Save and Submit Report**.

Copy Report Definition

The user has the option to copy the existing report definition. It can be used when the user wants to retain the existing report as well as have a customised report.

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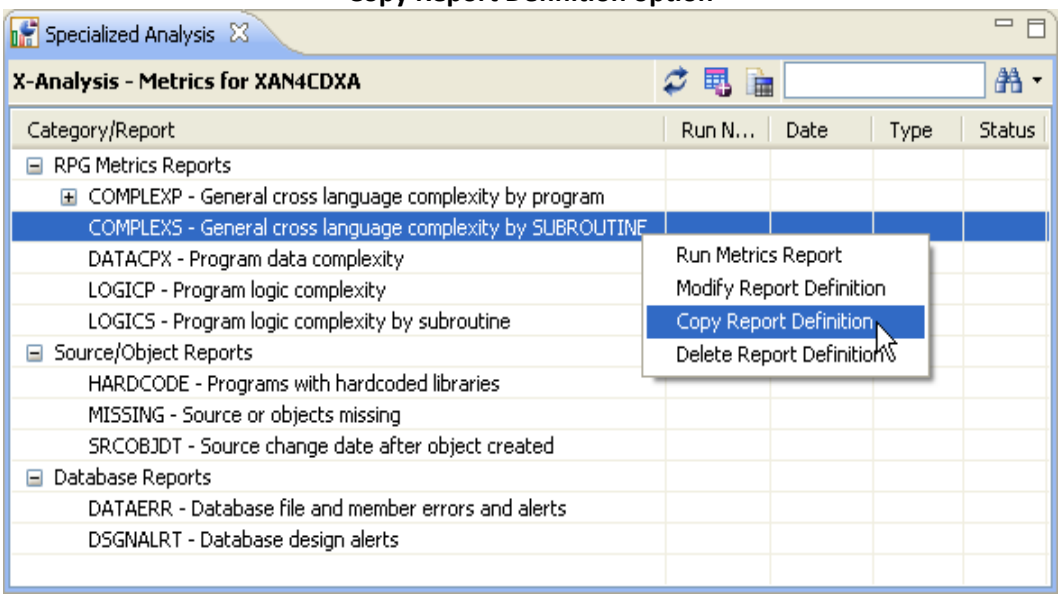
Copy Report Definition option


Specialized Analysis
X-Analysis - Metrics for XAN4CDXA
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COMPLEXP - General cross language complexity by program
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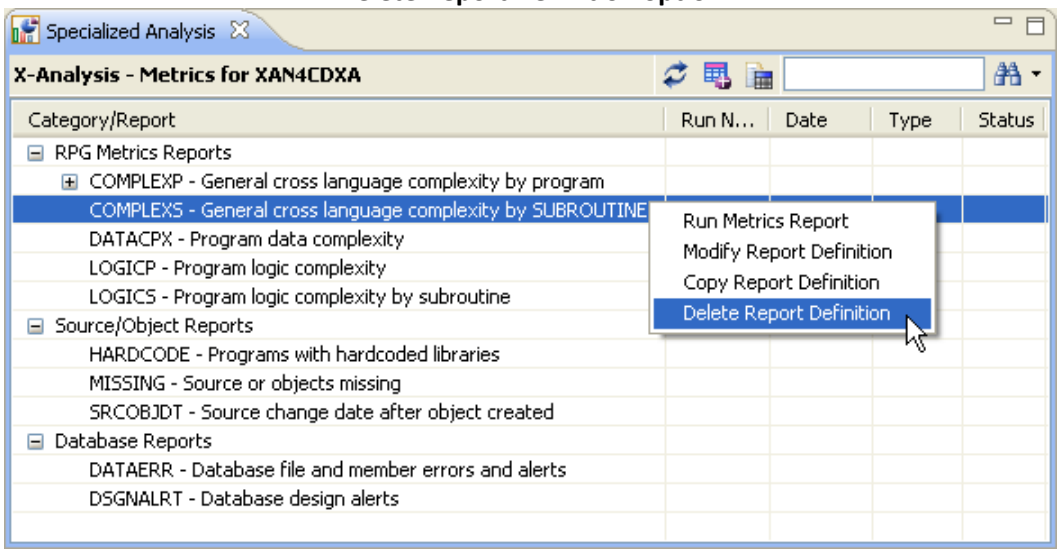
DSGNALRT - Database design alerts
Run Metrics Report
Modify Report Definition
Copy Report Definition
Delete Report Definition

Delete Report Definition

The user can delete an existing report definition using the **Delete Report Definition** option:

Delete Report Definition option


Specialized Analysis
X-Analysis - Metrics for XAN4CDXA
Category/Report
Run N...
Date
Type
Status
RPG Metrics Reports
COMPLEXP - General cross language complexity by program
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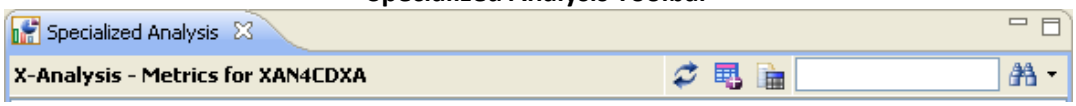
SRCOBJDT - Source change date after object created
Database Reports
DATAERR - Database file and member errors and alerts
DSGNALRT - Database design alerts
Run Metrics Report
Modify Report Definition
Copy Report Definition
Delete Report Definition

Specialized Analysis Toolbar

The Specialized Analysis toolbar comprises various options which are discussed below:

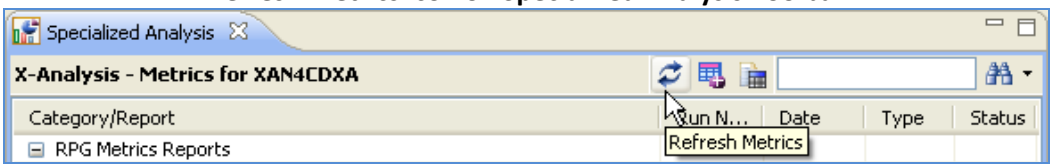
Specialized Analysis Toolbar



Refresh Metrics

The **Refresh Metrics** icon performs the refresh function.

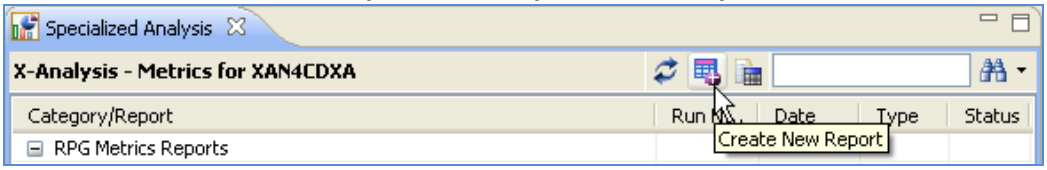
Refresh Metrics icon on Specialized Analysis Toolbar



Create New Report

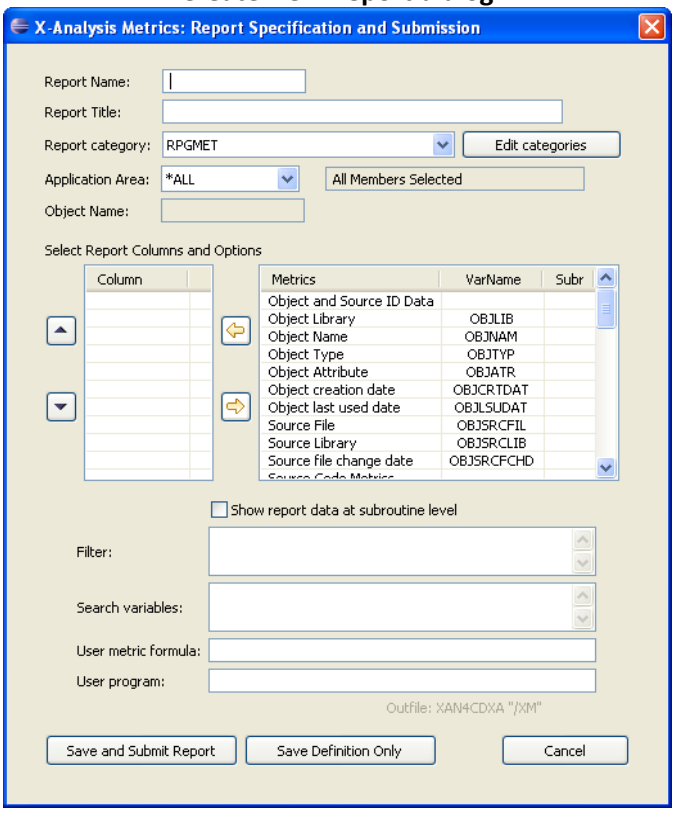
The user can create a customised report. For this, the **Create New Report** icon is available on the toolbar:

Create New Report icon on Specialized Analysis Toolbar



The following report definition dialog is invoked when the user clicks the **Create New Report** icon:

Create New Report dialog



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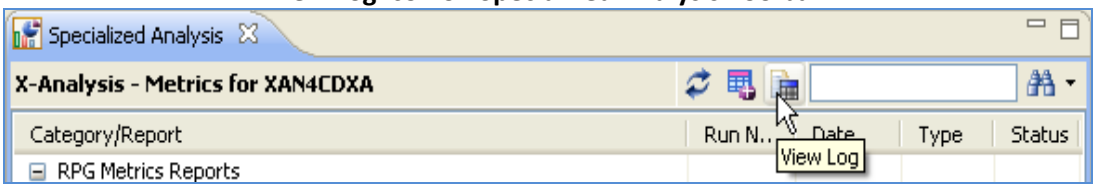
View Log

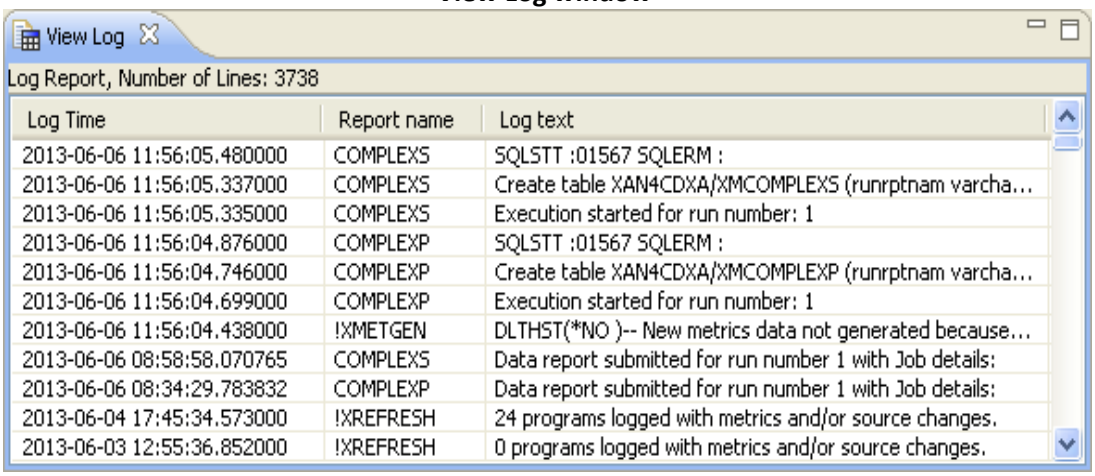
The user can view log related to Metrics processing. The **View Log** icon is available on the toolbar as shown below:

View Log icon on Specialized Analysis Toolbar



Click the **View Log** icon to check the log:

View Log window


View Log
Log Report, Number of Lines: 3738
Log Time
Report name
Log text
2013-06-06 11:56:05.480000 COMPLEXS SQLSTT :01567 SQLERM :
2013-06-06 11:56:05.337000 COMPLEXS Create table XAN4CDXA/XMCOMPLEXS (runrptnam varcha...
2013-06-06 11:56:05.335000 COMPLEXS Execution started for run number: 1
2013-06-06 11:56:04.876000 COMPLEXP SQLSTT :01567 SQLERM :
2013-06-06 11:56:04.746000 COMPLEXP Create table XAN4CDXA/XMCOMPLEXP (runrptnam varcha...
2013-06-06 11:56:04.699000 COMPLEXP Execution started for run number: 1
2013-06-06 11:56:04.438000 !XMETGEN DLTHST(*NO)-- New metrics data not generated because...
2013-06-06 08:58:58.070765 COMPLEXS Data report submitted for run number 1 with Job details:
2013-06-06 08:34:29.783832 COMPLEXP Data report submitted for run number 1 with Job details:
2013-06-04 17:45:34.573000 !XREFRESH 24 programs logged with metrics and/or source changes.
2013-06-03 12:55:36.852000 !XREFRESH 0 programs logged with metrics and/or source changes.

PROBLEM ANALYSIS

After the Generate Problem Analysis batch job is over, select the **Problem Analysis** option from the **Audit Options** under the context menu on **XAN4CDXA**, to display the Problem Analysis data.

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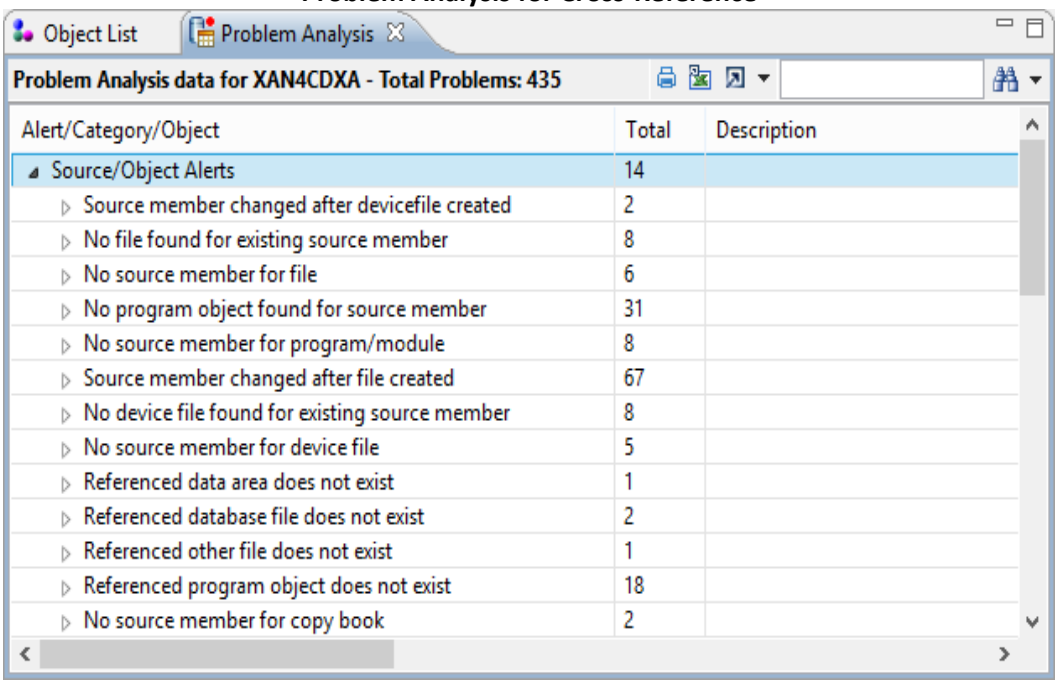
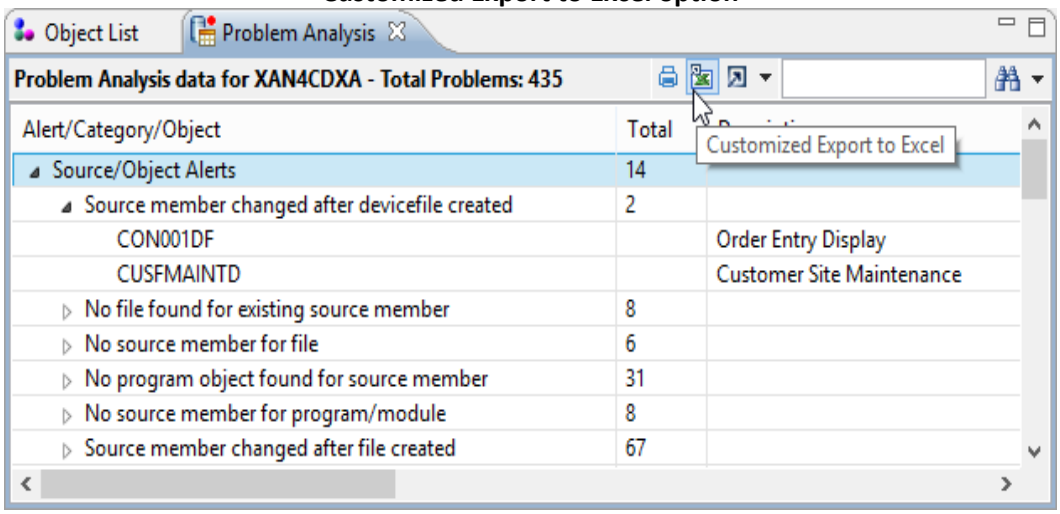
Problem Analysis for Cross-Reference


Object List
Problem Analysis
Problem Analysis data for XAN4CDXA - Total Problems: 435
Alert/Category/Object
Total
Description
Source/Object Alerts 14
Source member changed after devicefile created 2
No file found for existing source member 8
No source member for file 6
No program object found for source member 31
No source member for program/module 8
Source member changed after file created 67
No device file found for existing source member 8
No source member for device file 5
Referenced data area does not exist 1
Referenced database file does not exist 2
Referenced other file does not exist 1
Referenced program object does not exist 18
No source member for copy book 2

Expand the available Problem Category section to view name of the files having problems.

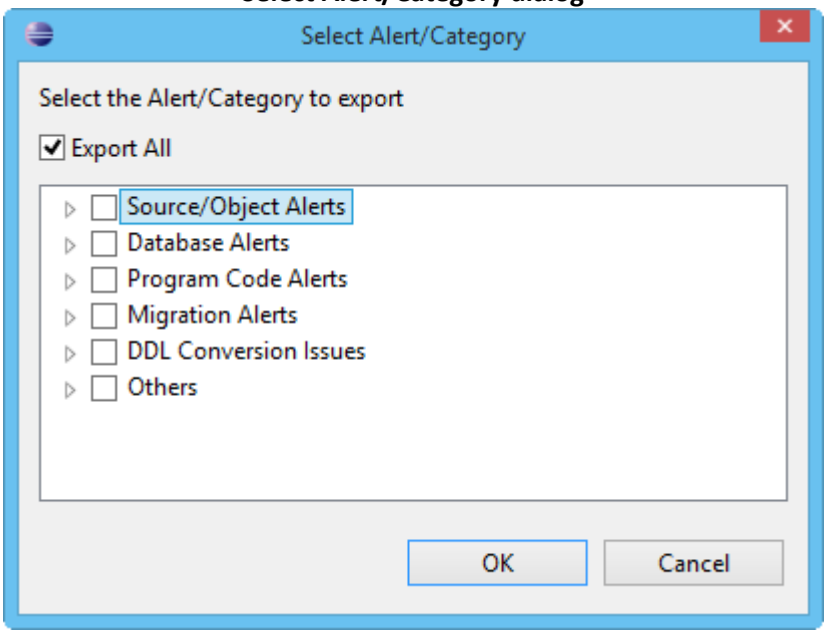
There is an option to allow **Customized Export to Excel** for the Problem Analysis data.

Customized Export to Excel option


Object List
Problem Analysis
Problem Analysis data for XAN4CDXA - Total Problems: 435
Customized Export to Excel
Alert/Category/Object
Total
Source/Object Alerts 14
Source member changed after devicefile created 2
CON001DF Order Entry Display
CUSFMAINTD Customer Site Maintenance
No file found for existing source member 8
No source member for file 6
No program object found for source member 31
No source member for program/module 8
Source member changed after file created 67

Clicking on this icon will invoke the following dialog:

Select Alert/Category dialog

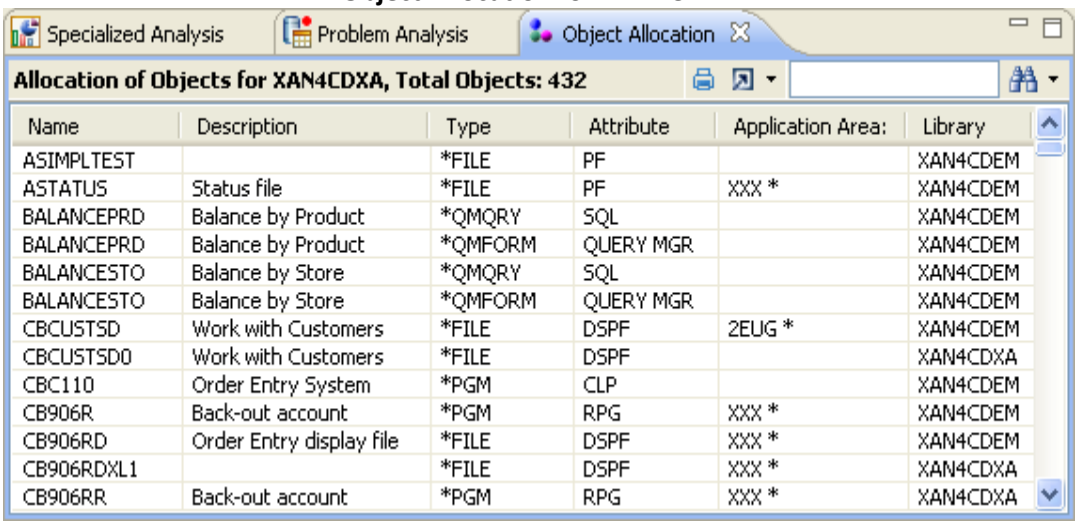


The user can individually select Categories to be exported to Excel. By default, the **Export All** box is checked.

OBJECT ALLOCATION

The **Object Allocation** option displays the information about all objects along with the application area names to which they belong. The following screen displays the Object Allocation window:

Object Allocation for XAN4CDXA



Name	Description	Type	Attribute	Application Area:	Library
ASIMPLTEST		*FILE	PF		XAN4CDEM
ASTATUS	Status file	*FILE	PF	XXX *	XAN4CDEM
BALANCEPRD	Balance by Product	*QMQRY	SQL		XAN4CDEM
BALANCEPRD	Balance by Product	*QMFORM	QUERY MGR		XAN4CDEM
BALANCESTO	Balance by Store	*QMQRY	SQL		XAN4CDEM
BALANCESTO	Balance by Store	*QMFORM	QUERY MGR		XAN4CDEM
CBCUSTSD	Work with Customers	*FILE	DSPF	2EUG *	XAN4CDEM
CBCUSTSD0	Work with Customers	*FILE	DSPF		XAN4CDXA
CBC110	Order Entry System	*PGM	CLP		XAN4CDEM
CB906R	Back-out account	*PGM	RPG	XXX *	XAN4CDEM
CB906RD	Order Entry display file	*FILE	DSPF	XXX *	XAN4CDEM
CB906RDXL1		*FILE	DSPF	XXX *	XAN4CDXA
CB906RR	Back-out account	*PGM	RPG	XXX *	XAN4CDXA

The above screen lists all objects from the application library, **XAN4CDXA** and provides information about application areas. Notice that some rows were blank under the

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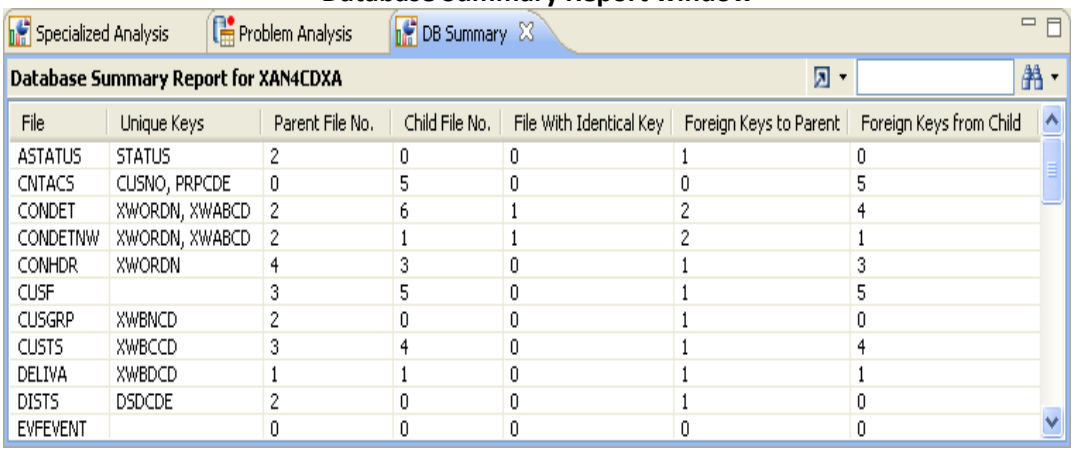
application area column, which means that the object does not belong to any application area. Similarly, note the '*' sign which means that the object belongs to multiple application areas.

DATABASE SUMMARY

The **Database Summary** option gives the user access to the summarized database report for the entire cross-reference library. The report contains information related to files, their unique keys and other necessary file-related details. On clicking the option, the following window is displayed:

Database Summary Report window



File	Unique Keys	Parent File No.	Child File No.	File With Identical Key	Foreign Keys to Parent	Foreign Keys from Child
ASTATUS	STATUS	2	0	0	1	0
CNTACS	CUSNO, PRPCDE	0	5	0	0	5
CONDET	XWORDN, XWABCD	2	6	1	2	4
CONDETNW	XWORDN, XWABCD	2	1	1	2	1
CONHDR	XWORDN	4	3	0	1	3
CUSF		3	5	0	1	5
CUSGRP	XWBNCD	2	0	0	1	0
CUSTS	XWBCCD	3	4	0	1	4
DELIVA	XWBDCD	1	1	0	1	1
DISTS	DSDCDE	2	0	0	1	0
EVFEVENT		0	0	0	0	0

SUMMARY REPORT

The **Summary Report** option is available under the **Audit Options** submenu on the context menu of cross-reference library and application areas.

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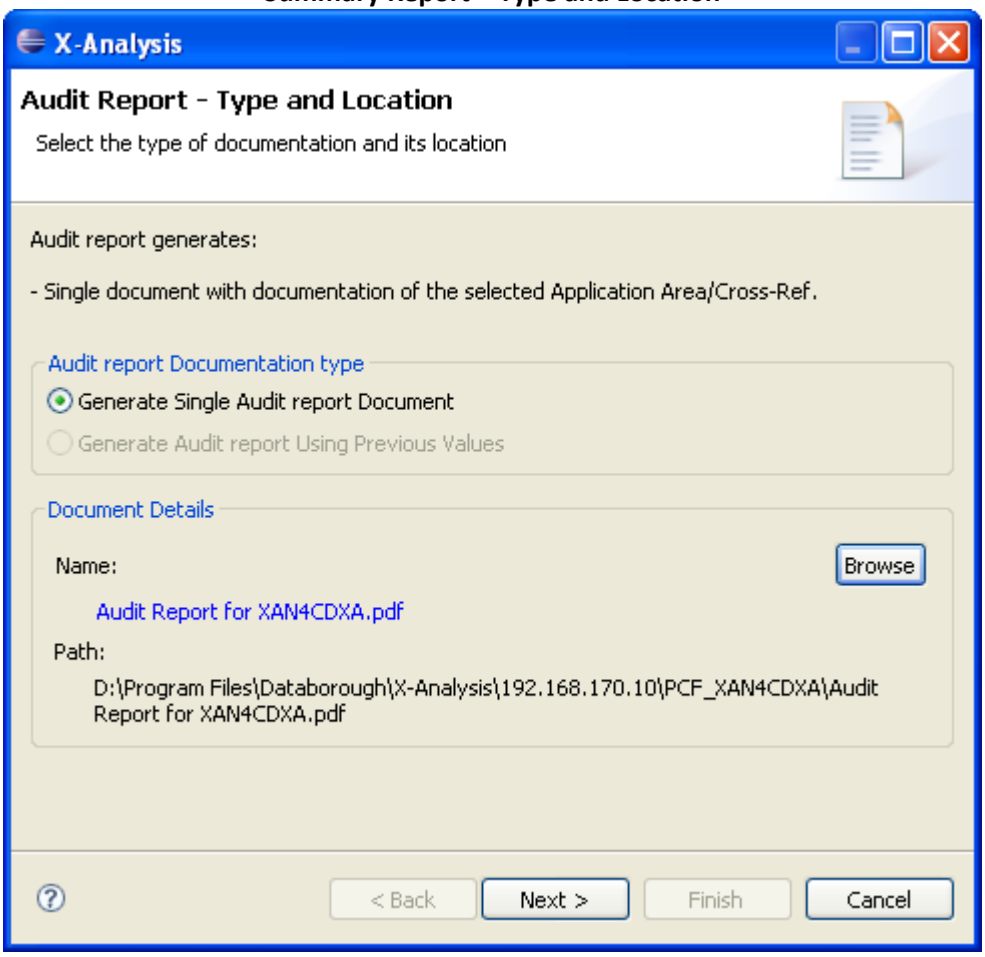
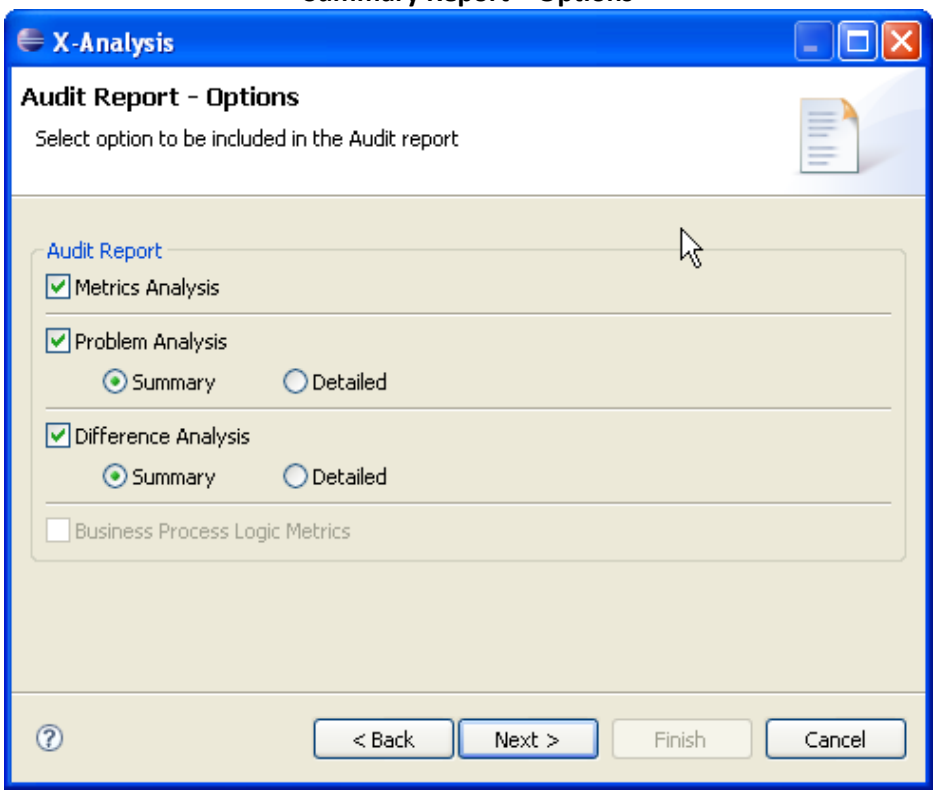
Summary Report – Type and Location



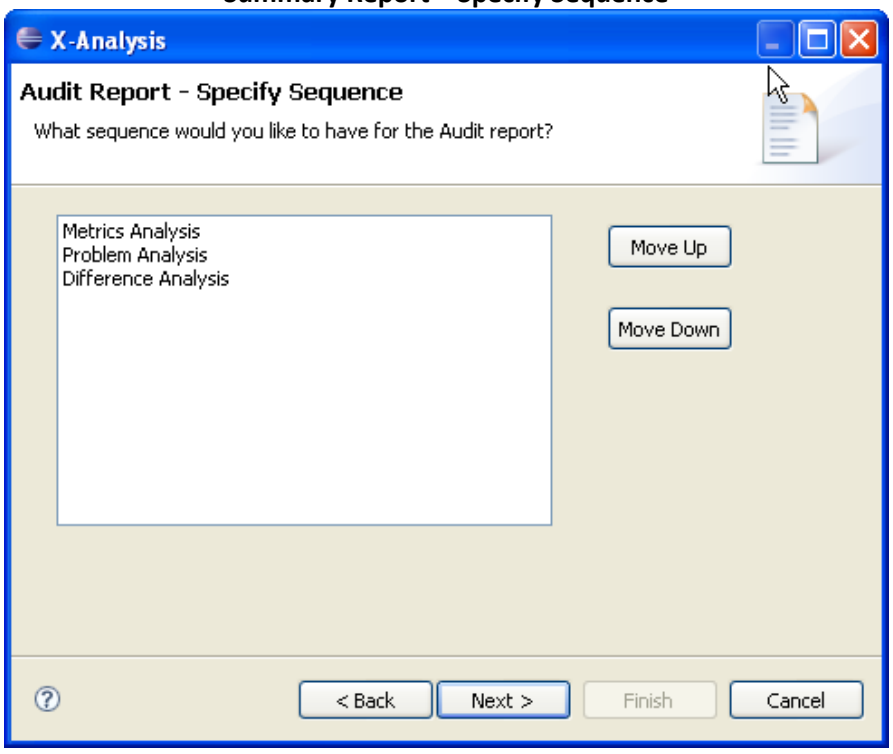
Specify Type and Location. Click **Next**.

Summary Report – Options



Mark options to be included in the Summary Report and click **Next**.

Summary Report – Specify Sequence



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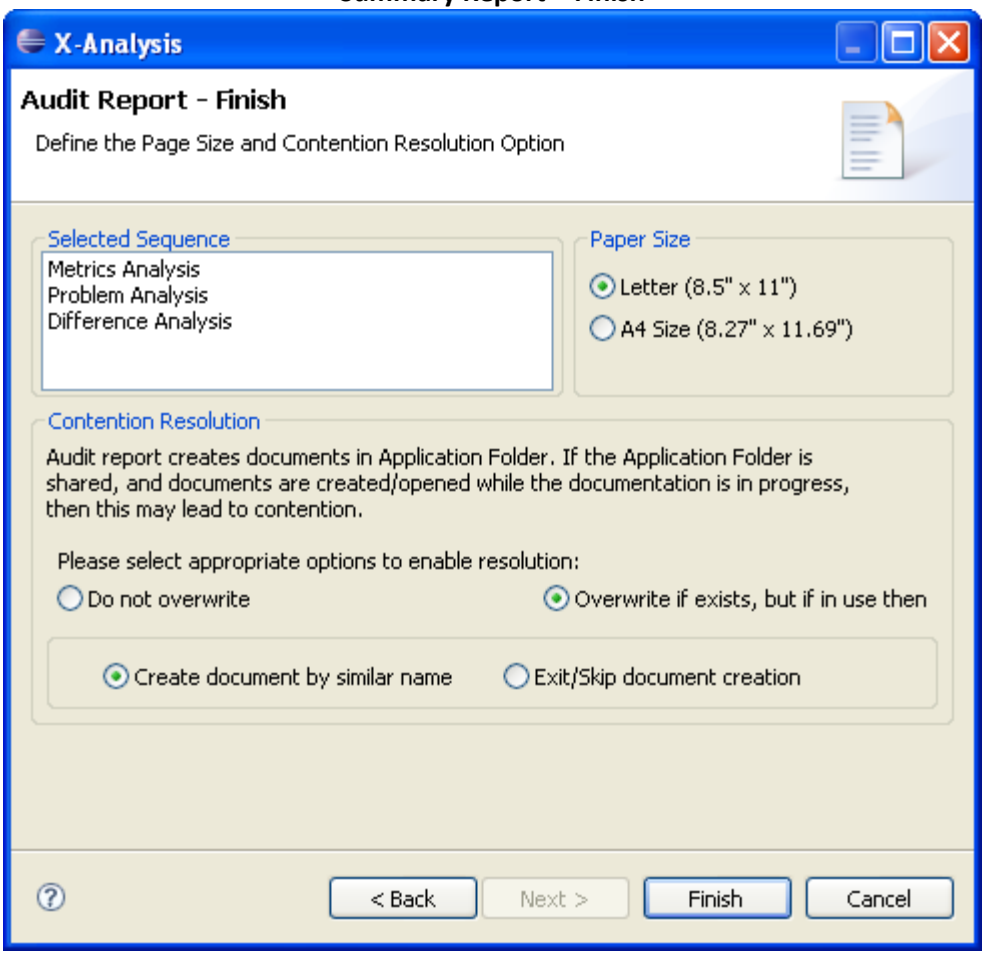
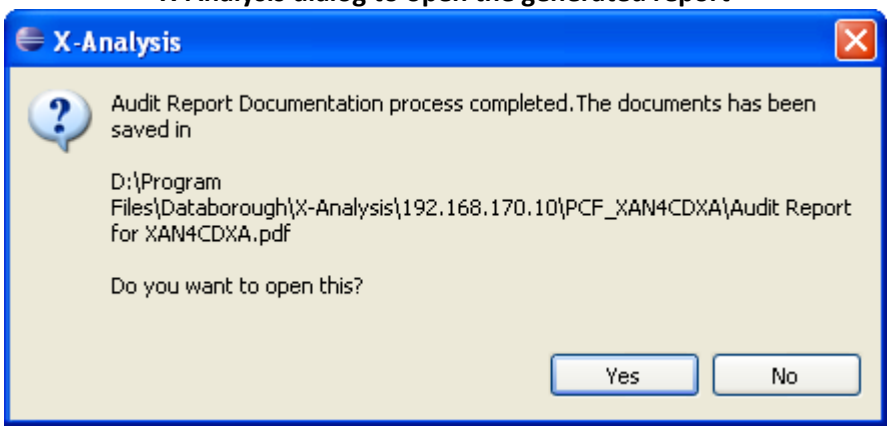
Specify the sequence of contents for the Summary Report and click **Next**.

Summary Report – Finish


X-Analysis
Audit Report - Finish
Define the Page Size and Contention Resolution Option
Selected Sequence
Metrics Analysis
Problem Analysis
Difference Analysis
Paper Size
Letter (8.5" x 11")
A4 Size (8.27" x 11.69")
Contention Resolution
Audit report creates documents in Application Folder. If the Application Folder is shared, and documents are created/opened while the documentation is in progress, then this may lead to contention.
Please select appropriate options to enable resolution:
Do not overwrite
Overwrite if exists, but if in use then
Create document by similar name
Exit/Skip document creation
< Back
Next >
Finish
Cancel

Choose desired settings for the Audit Report and click **Finish** to generate the report. When the generation is over, the following dialog appears which asks to open the generated document:

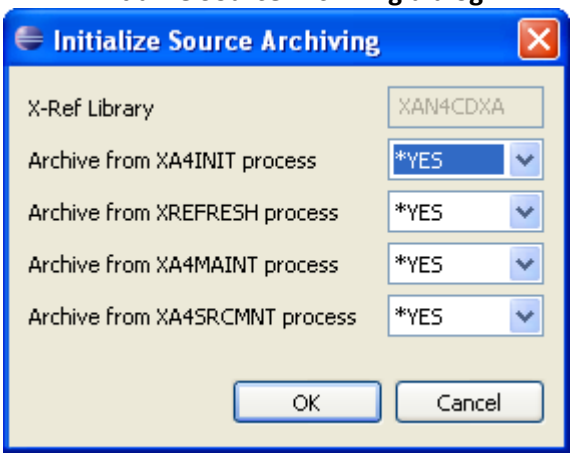
X-Analysis dialog to open the generated report


X-Analysis
Audit Report Documentation process completed.The documents has been saved in
D:\Program Files\Databorough\X-Analysis\192.168.170.10\PCF_XAN4CDXA\Audit Report for XAN4CDXA.pdf
Do you want to open this?
Yes
No

INITIALIZE SOURCE ARCHIVING

Source archiving can be run independently of metrics. The **Initialize Source Archiving** option is available for the cross-reference library and the application areas. When the user chooses the option, the following dialog is invoked:

Initialize Source Archiving dialog



Source archiving is started by the **XACVINI** command, which sets up a controlling *DTAARA in the XA library and makes an initial copy of all source codes. If archiving is deactivated and then restarted later, the initial archived copy is not made. Source archiving can be deactivated by XACVEND, which optionally clears all source archives and controlling data. This command can only be run on the server.

Files

All archived source versions are recorded in XAACVSRC, whose data is only ever purged when XACVEND DLTHISTO(*YES) is run (whereas metrics can be purged independently, which clears XMETOBJ). When archiving is active, the source date-time of the latest version archived is recorded in XAACVHDR. Archiving handles all the source types (whereas metrics only records for CL, RPG and CBL).

Source archiving continues to maintain data in XMETOBJ/XMETOBJH, if necessary. The data in XMETOBJ/XMETOBJH is not necessary to the source archiving process itself, but is used by the PC client to locate the change history. If data is written to XMETOBJ by source archiving, the SRCACT field is set to the value 'A'.

Processing

Source archiving is invoked from XA4INIT, XREFRESH, XA4MAINT and XA4SRCMNT, which all call the wrapper program, XRACVMBR.

The archive processing itself is done in *srvpgm XACV, in procedure XACV_ArchiveMember(). This procedure checks the source update date-time against the date-time recorded in XAACVHDR. If there is a difference, archiving takes place i.e. copy

the source, write out to XAACVSRC, update XAACVHDR, and write out to XMETOBJ/XMETOBJH, if appropriate data is not already present in these files.

The wrapper command/program XACVMBR/XRACVMBR first checks whether metrics is active, then performs either:

a) if metrics are active, writes out a record to XMETCHGS, which will cause metrics processing to take place when XRMETCHGS is called, which is the case in XREFRESH, XA4INIT, and XA4SRCMNT or

b) if metrics are not active, calls procedure XACV_ArchiveMember().

If metrics is active, then the source archiving call is made from metrics processing, which will call XACV_ArchiveMember(). This is so that metrics will write the appropriate XMETOBJ/XMETOBJH records before source archive processing takes place.

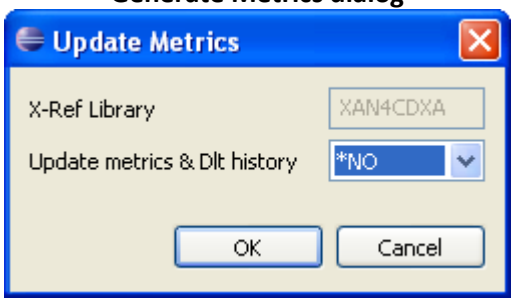
Purge

A purge process (command XACVPRG) will move source to a user-specified library, and record the location in XAACVSRC. Purge is by cut-off date, as compared to the archive timestamp in XAACVSRC. The purge process always leaves one source version in place, even if the timestamp is older than the cut-off date.

Generate Metrics Analysis

The **Generate Metrics Analysis** option generates the metrics data for the selected cross-reference library. The following dialog is displayed when you select the **Generate Metrics Analysis** option:

Generate Metrics dialog

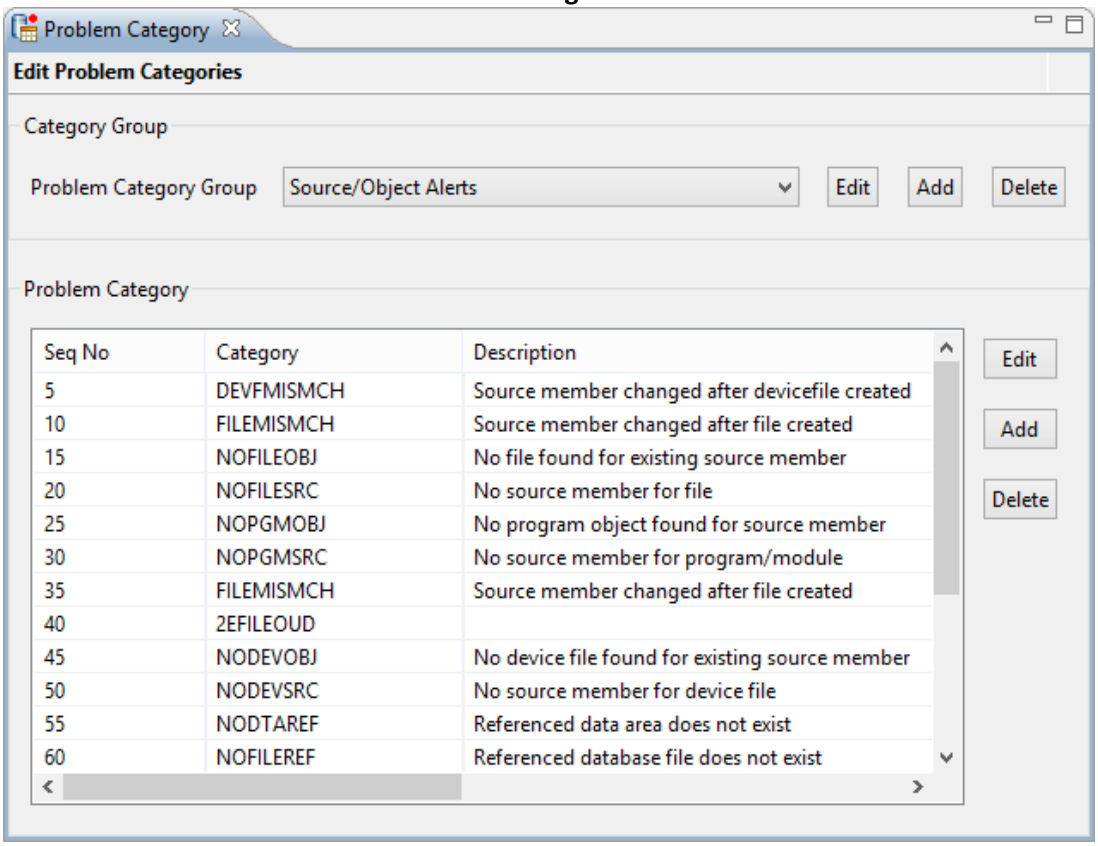


A batch job is submitted when the user clicks **OK**.

Edit Problem Categories

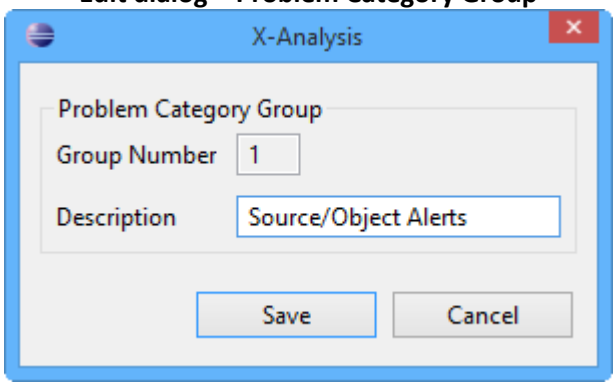
You can add a new category or edit/delete a previously-existing category by selecting the **Edit Problem Categories** option. Such modifications can be made for the main category i.e. the Problem Category group as well as for the sub-categories. Select the option to invoke the following dialog:

Edit Problem Categories window


Problem Category
Edit Problem Categories
Category Group
Problem Category Group
Source/Object Alerts
Edit
Add
Delete
Problem Category
Seq No
Category
Description
5 DEVFMISMCH Source member changed after devicefile created
10 FILEMISMCH Source member changed after file created
15 NOFILEOBJ No file found for existing source member
20 NOFILESRC No source member for file
25 NOPGMOBJ No program object found for source member
30 NOPGMSRC No source member for program/module
35 FILEMISMCH Source member changed after file created
40 2EFILEOUD
45 NODEVOBJ No device file found for existing source member
50 NODEVSRC No source member for device file
55 NODTAREF Referenced data area does not exist
60 NOFILEREF Referenced database file does not exist
Edit
Add
Delete

Use the **Edit**, **Add**, or **Delete** buttons to make changes to the Problem Category Group. Click **Edit** to invoke the following dialog:

Edit dialog – Problem Category Group



Edit the **Group Number** and/or the **Description**. Click **Save**.

Click **Add** to invoke the following dialog:

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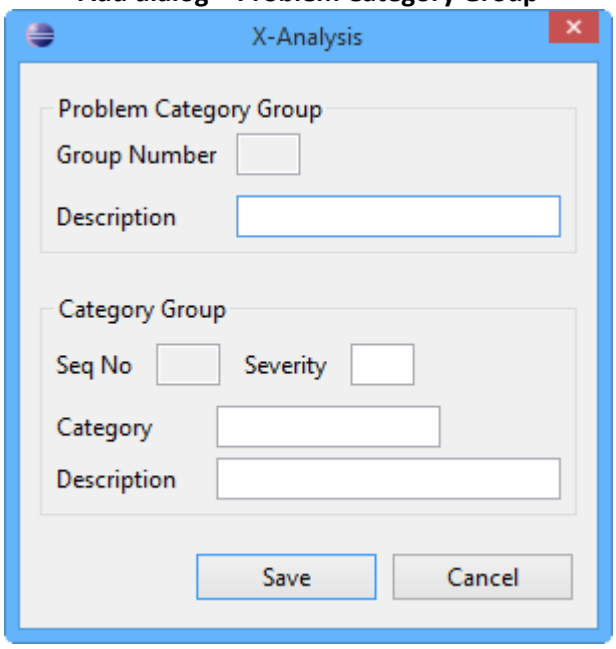
Add dialog – Problem Category Group



Enter details in the given fields. In the Category Group section, enter the sequence number and the severity scale to be assigned to the new category. The Severity scale indicates the complexity of the problem and is based on the combination of problem report data and additional data. Click **Save**. The new category will appear in the **Edit Problem Categories** window.

On selecting the **Delete** option, a window appears which asks the user's confirmation before deleting a specific category.

Similarly, you can select the **Edit** and/or **Delete** options for the displayed sub-categories. By selecting the **Add** option, the user can add a new category under a pre-defined main category.

Note that you must make a few changes on the server-side for editing the problem categories on the client-side.

If you have to add new problem category TRIGGERS with description like "FILE HAS TRIGGERS", follow the steps given below to add problem category in the **XPRBCATS** file.

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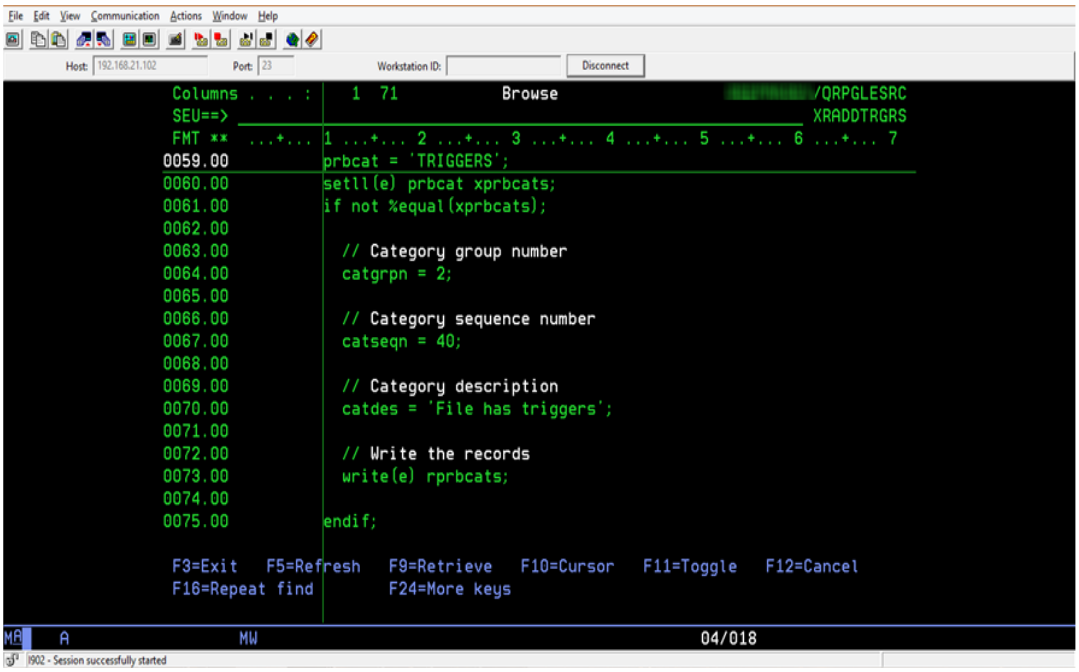
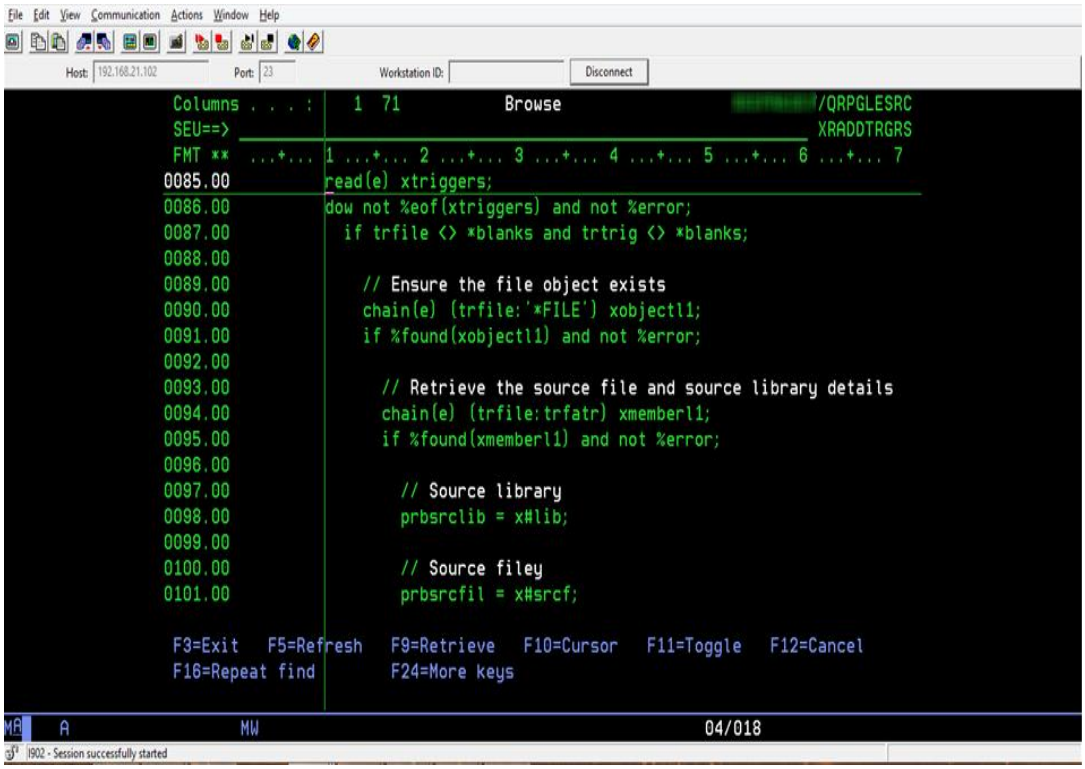
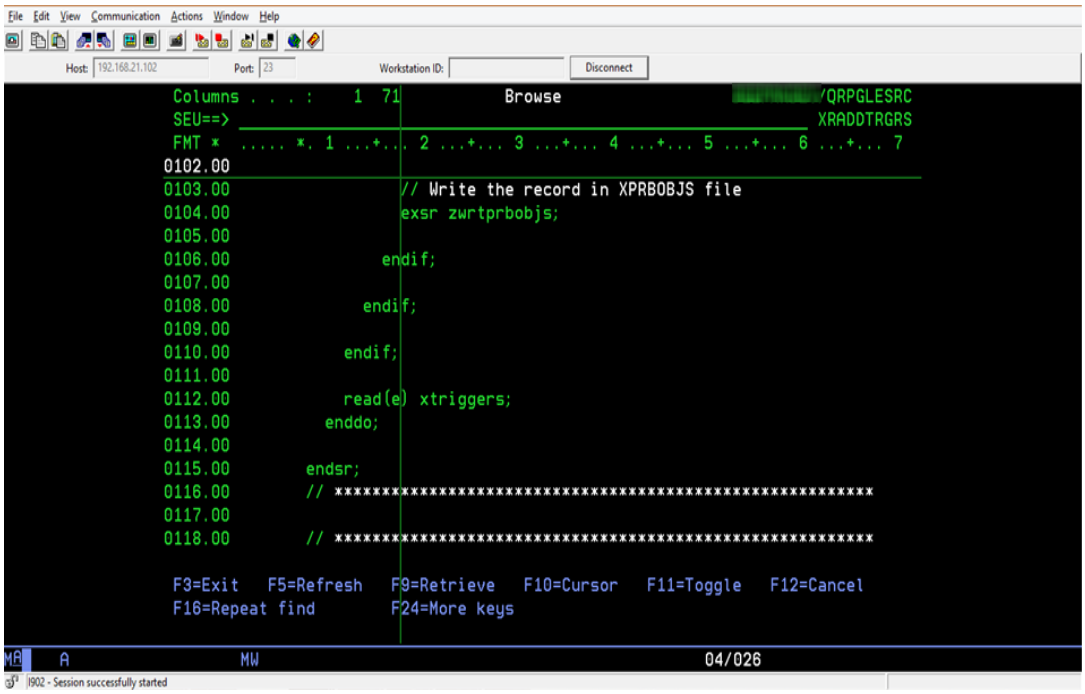
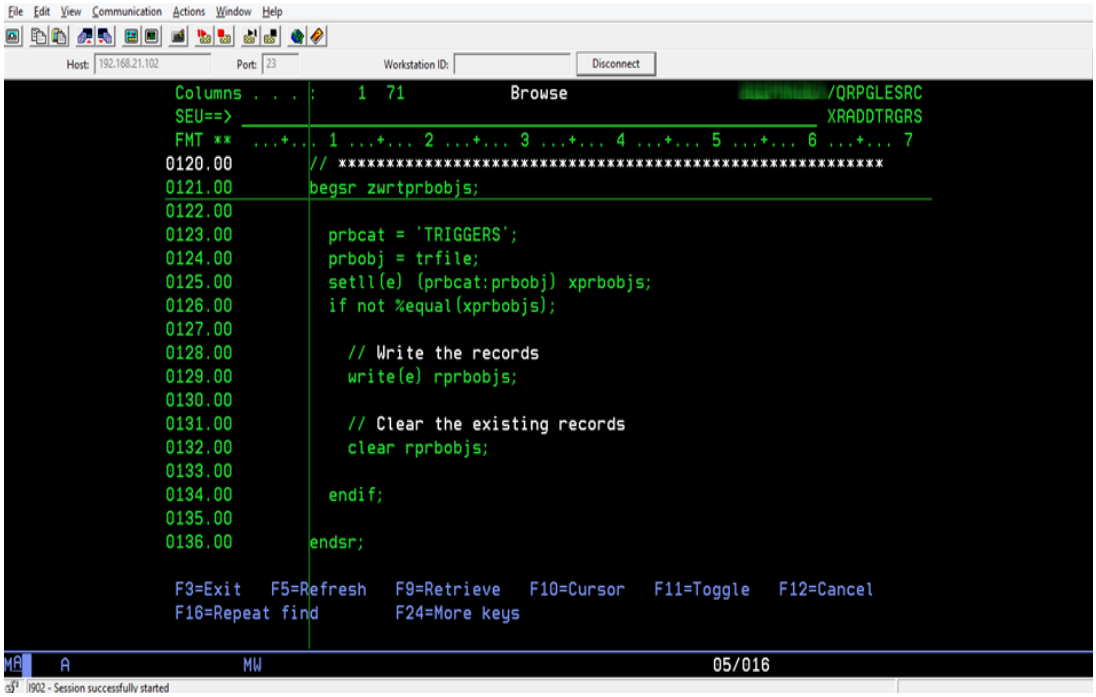

File Edit View Communication Actions Window Help
Host: 192.168.21.102 Port: 23 Workstation ID: Disconnect
Columns . . . : 1 71 Browse /QRPGLESRC
SEU==> XRADDTRGRS
FMT ** ...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
0059.00 prbcat = 'TRIGGERS';
0060.00 setll(e) prbcat xprbcats;
0061.00 if not %equal(xprbcats);
0062.00
0063.00 // Category group number
0064.00 catgrpn = 2;
0065.00
0066.00 // Category sequence number
0067.00 catseqn = 40;
0068.00
0069.00 // Category description
0070.00 catdes = 'File has triggers';
0071.00
0072.00 // Write the records
0073.00 write(e) rprbcats;
0074.00
0075.00 endif;
F3=Exit F5=Refresh F9=Retrieve F10=Cursor F11=Toggle F12=Cancel
F16=Repeat find F24=More keys
MA A MW 04/018
I902 - Session successfully started

You will get CATGRPN and CATSEQN fields value from XA while adding new problem category.

To write the entry in the **XPRBOBJS** file for the above category you have to write your own logic as displayed below:


File Edit View Communication Actions Window Help
Host: 192.168.21.102 Port: 23 Workstation ID: Disconnect
Columns . . . : 1 71 Browse /QRPGLESRC
SEU==> XRADDTRGRS
FMT ** ...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
0085.00 read(e) xtriggers;
0086.00 dow not %eof(xtriggers) and not %error;
0087.00 if trfile <> *blanks and trtrig <> *blanks;
0088.00
0089.00 // Ensure the file object exists
0090.00 chain(e) (trfile:'*FILE') xobjectl1;
0091.00 if %found(xobjectl1) and not %error;
0092.00
0093.00 // Retrieve the source file and source library details
0094.00 chain(e) (trfile:trfatr) xmemberl1;
0095.00 if %found(xmemberl1) and not %error;
0096.00
0097.00 // Source library
0098.00 prbsrclib = x#lib;
0099.00
0100.00 // Source filey
0101.00 prbsrcfil = x#srcf;
F3=Exit F5=Refresh F9=Retrieve F10=Cursor F11=Toggle F12=Cancel
F16=Repeat find F24=More keys
MA A MW 04/018
I902 - Session successfully started




File Edit View Communication Actions Window Help
Host: 192.168.21.102 Port: 23 Workstation ID: Disconnect
Columns . . . : 1 71 Browse /QRPGLESRC
SEU==> XRADDTRGRS
FMT ** ...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
0120.00 // **
0121.00 begsr zwrtprbobjs;
0122.00
0123.00 prbcat = 'TRIGGERS';
0124.00 prbobj = trfile;
0125.00 setll(e) (prbcat:prbobj) xprbobjs;
0126.00 if not %equal(xprbobjs);
0127.00
0128.00 // Write the records
0129.00 write(e) rprbobjs;
0130.00
0131.00 // Clear the existing records
0132.00 clear rprbobjs;
0133.00
0134.00 endif;
0135.00
0136.00 endsr;
F3=Exit F5=Refresh F9=Retrieve F10=Cursor F11=Toggle F12=Cancel
F16=Repeat find F24=More keys
MA A MW 05/016
I902 - Session successfully started

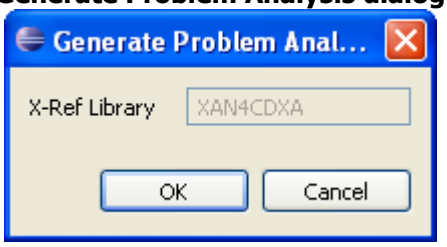
These modifications in the Problem Analysis will be reflected in the Problem Analysis Editor (when taken).

Now, when you select the **Problem Analysis** option, the Edited Category can be seen there.

GENERATE PROBLEM ANALYSIS

The Generate Problem Analysis analyzes the application database files and reports problems. Select the **Generate Problem Analysis** option from the **Audit Options** on the context menu of the X-Analysis application. This invokes the following dialog:

Generate Problem Analysis dialog



Click **OK** to invoke the batch job command.

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UML Diagramming

X-Analysis provides various options for UML diagramming on RPG/RPT/SQLRPG types of programs. The following options are available in X-Analysis for UML diagramming:

- Re-generate UML
- Activity Diagram
- Class Diagram

The UML Diagramming options are available on the context menu under the **UML Options** submenu on the Object/Member List.

THE PRE-REQUISITES

1. As a pre-requisite, users need to install the XAUML.msi (XA UML Support).
2. Use the Business Rules functionality to re-engineer the programs. The Activity Diagrams will then be generated on the re-engineered program(s).

Note: The UML functionality works only on the Eclipse 3.4 (provided with the Runtime Environment).

RE-GENERATE UML

When the **Re-generate UML** option is opted from the **UML Options** submenu available on the context menu over the Object/Member List, then it will generate the Activity Diagram and the Class Diagram for that Object.

ACTIVITY DIAGRAM

The Activity Diagram illustrates the dynamic nature of a system by modelling the flow of control from activity to activity. An activity represents an operation on some class in the system that results in a change in the state of the system. Typically, Activity Diagrams are used to model workflow or business processes and internal operation.

Let us see how an Activity Diagram looks for our example. From the tutorial application **XAN4CDXA**, select the **CUSTMNT1** program and opt for the context menu on it, then select the **Activity Diagram** option. This invokes the Activity Diagram as displayed below:

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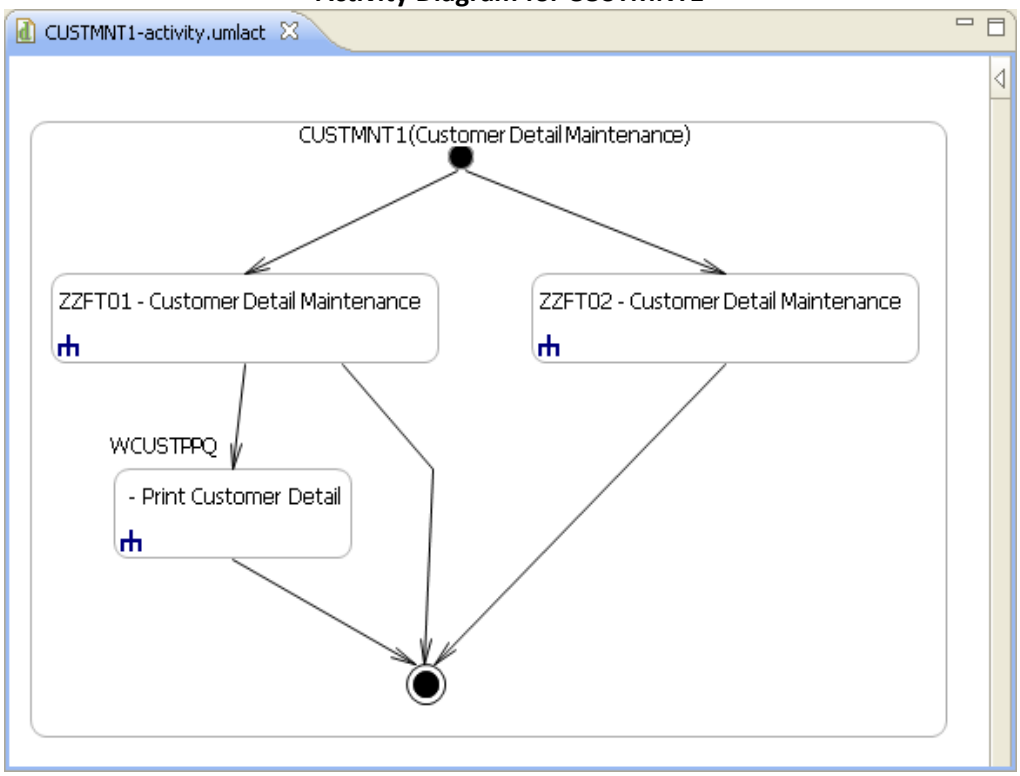
Activity Diagram for CUSTMNT1



Function Logic

The **Function Logic** is available as context menu on Activity Diagram. The following screen displays the **Function Logic** options on an Activity Diagram:

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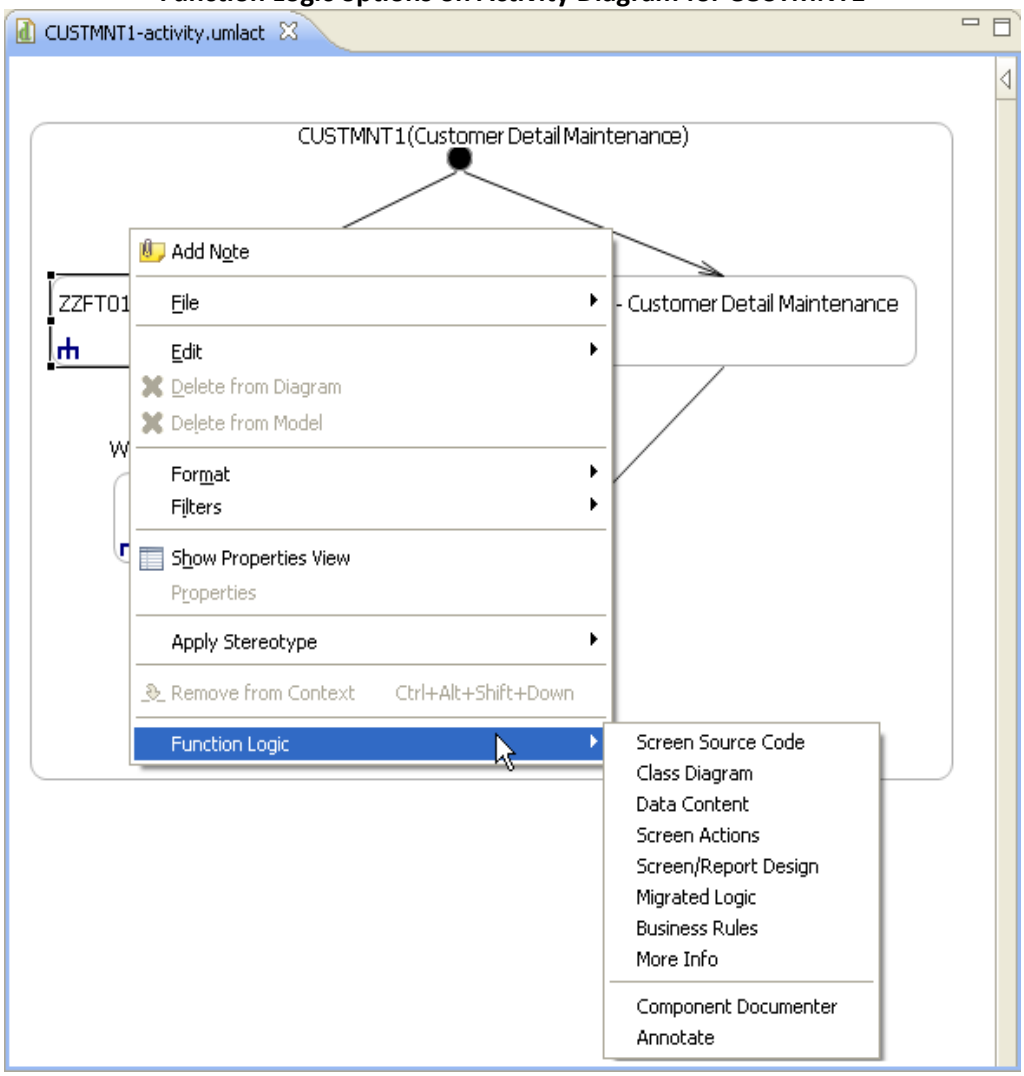
Function Logic options on Activity Diagram for CUSTMNT1



The Function Logic options work correctly when the X-Analysis application library is selected in the X-Analysis Perspective.

CLASS DIAGRAM

The Class Diagram is the backbone of all Object-oriented methods, including UML. The diagram describes the static structure of a system. Classes represent an abstraction of entities with common characteristics. Associations represent the relationships between classes.

Let us see how a Class Diagram looks for our example. From the tutorial application **XAN4CDXA**, select **CUSTMNT1** and opt for the context menu on it, then select the **Class Diagram** option. This action displays the Class Diagram as shown below:

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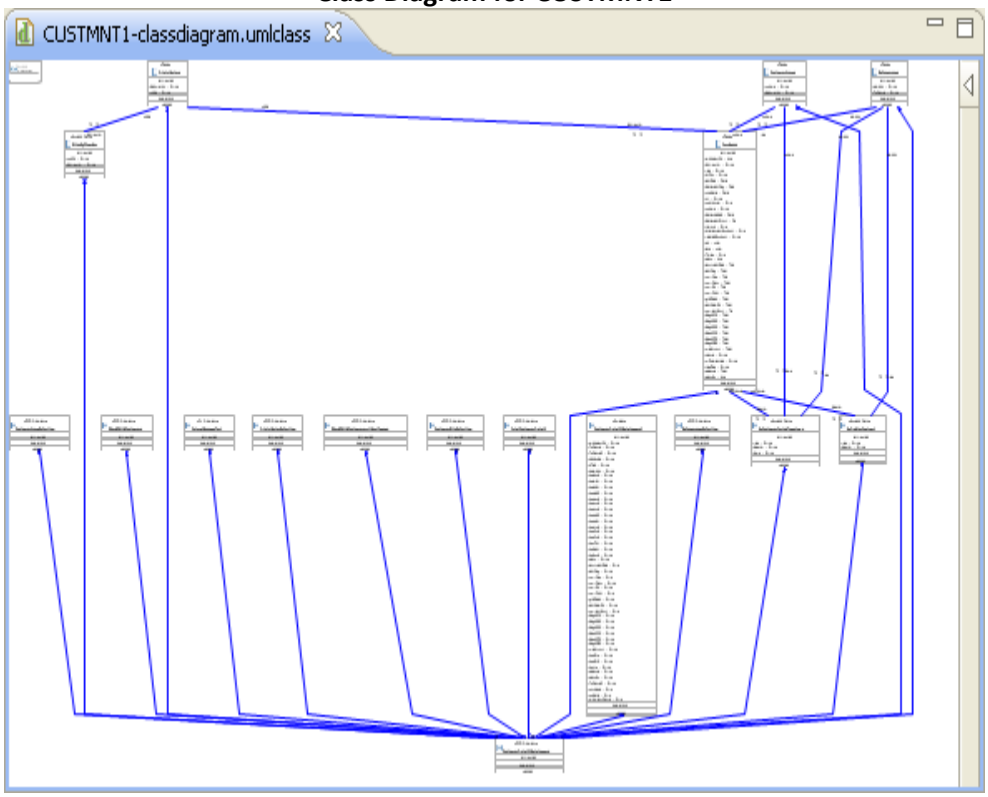
Class Diagram for CUSTMNT1



The Class Diagram displays the following:

1. Shows all the PF used by the program, and their relationships.
2. Joining fields are shown on the edge of the connection.
3. All the keys fields and field usage are shown inside the file figure as attribute with their types.

Function Logic

The Function Logic is available as context menu on the Class Diagram. The following screen displays the **Function Logic** options on a Class Diagram:

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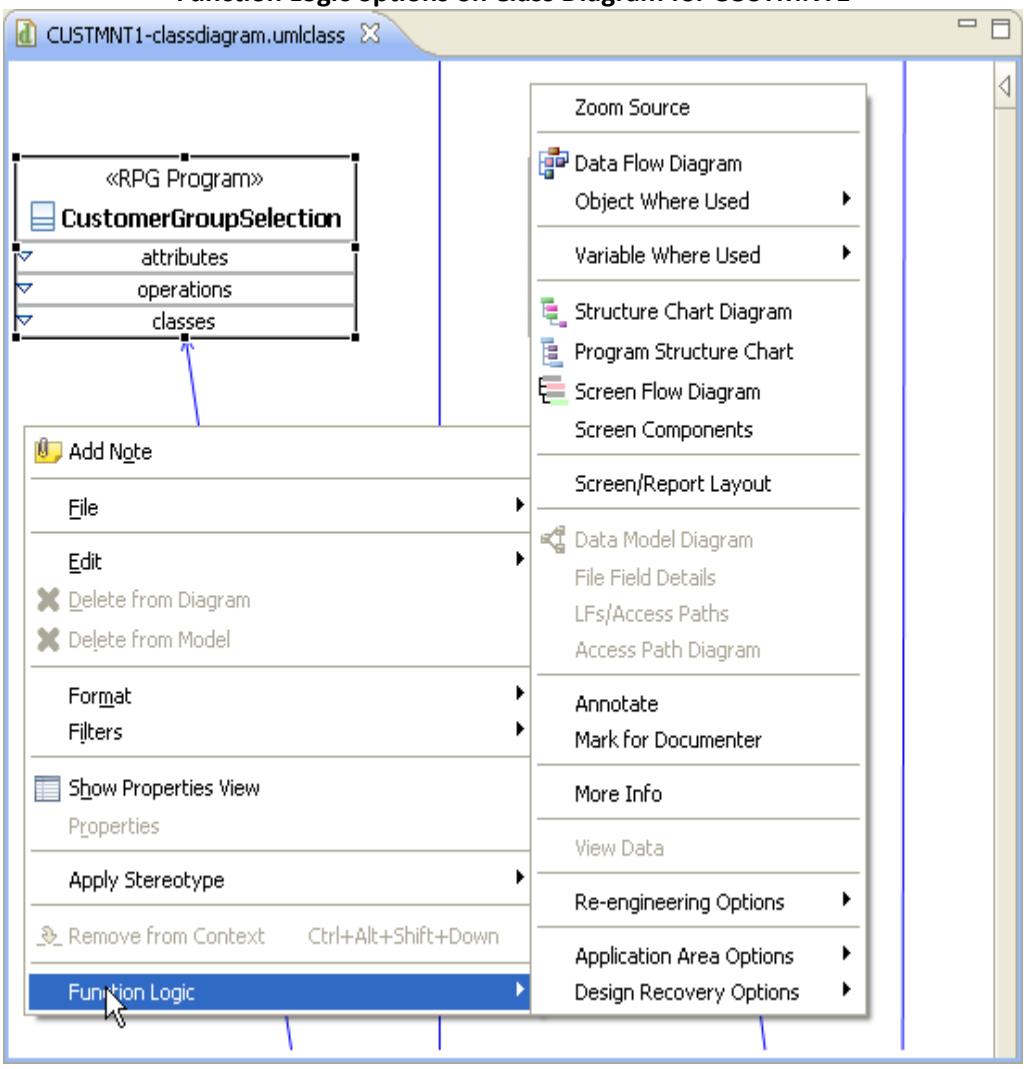
Function Logic options on Class Diagram for CUSTMNT1



RE-GENERATE UML FOR APPLICATION AREA

The **Re-generate UML** option on an application area generates Activity Diagram and Class Diagram for all objects belonging to the selected application area. Select the **MVCPROCESS** application area from **XAN4CDXA** and opt for the context menu on it. Then, select the **Re-generate UML** option from the **UML Options** submenu. This generates the Activity Diagram and the Class Diagram for all objects along with the Class Diagram for the selected application area.

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Data Management Features

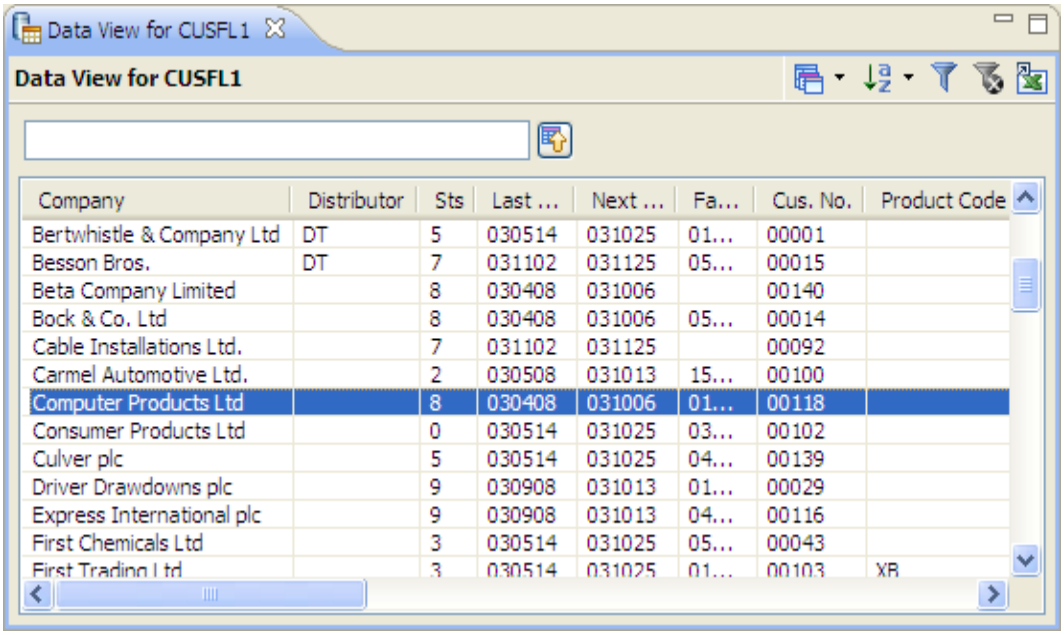
X-Analysis is unique in that it automatically derives the system data model by analyzing both the actual data contents and all programs that use this data to verify the existence of any cross-file relationships. These potential relationships are verified by performing an integrity check to ensure that all data from the dependent file does indeed validly reference data records from the owning file. In this way even the most complex legacy system can be data modelled with relatively no effort.

View Data

Using the **View Data** option from the context menu, the records of *FILE type objects (PFs and LFs) may be viewed.

On selecting the **View Data** option, the following Data View is displayed:

View Data on CUSFL1



Company	Distributor	Sts	Last ...	Next ...	Fa...	Cus. No.	Product Code
Bertwhistle & Company Ltd	DT	5	030514	031025	01...	00001	
Besson Bros.	DT	7	031102	031125	05...	00015	
Beta Company Limited		8	030408	031006		00140	
Bock & Co. Ltd		8	030408	031006	05...	00014	
Cable Installations Ltd.		7	031102	031125		00092	
Carmel Automotive Ltd.		2	030508	031013	15...	00100	
Computer Products Ltd		8	030408	031006	01...	00118	
Consumer Products Ltd		0	030514	031025	03...	00102	
Culver plc		5	030514	031025	04...	00139	
Driver Drawdowns plc		9	030908	031013	01...	00029	
Express International plc		9	030908	031013	04...	00116	
First Chemicals Ltd		3	030514	031025	05...	00043	
First Trading Ltd		3	030514	031025	01...	00103	XB

Data Dictionary

X-Analysis makes the seemingly complicated task of data modelling an easy one. When the data inherent in a specific application is accessible, data modelling can be a straightforward procedure. X-Analysis has the **Data Dictionary** option for this purpose.

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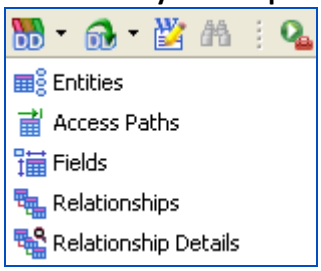
The Data Dictionary contains detailed information for every field in each file in the application database. Much of this data is the standard metadata extracted for each file and stored on the XDD file – for instance field and column names, field size and field type.

Thus, record metadata is readily available for use by other applications.

The user can invoke the Data Dictionary menu by clicking on the **Data Dictionary** icon available on the X-Analysis toolbar. This will show up the Data Dictionary submenu options. These options are:

Data Dictionary menu options

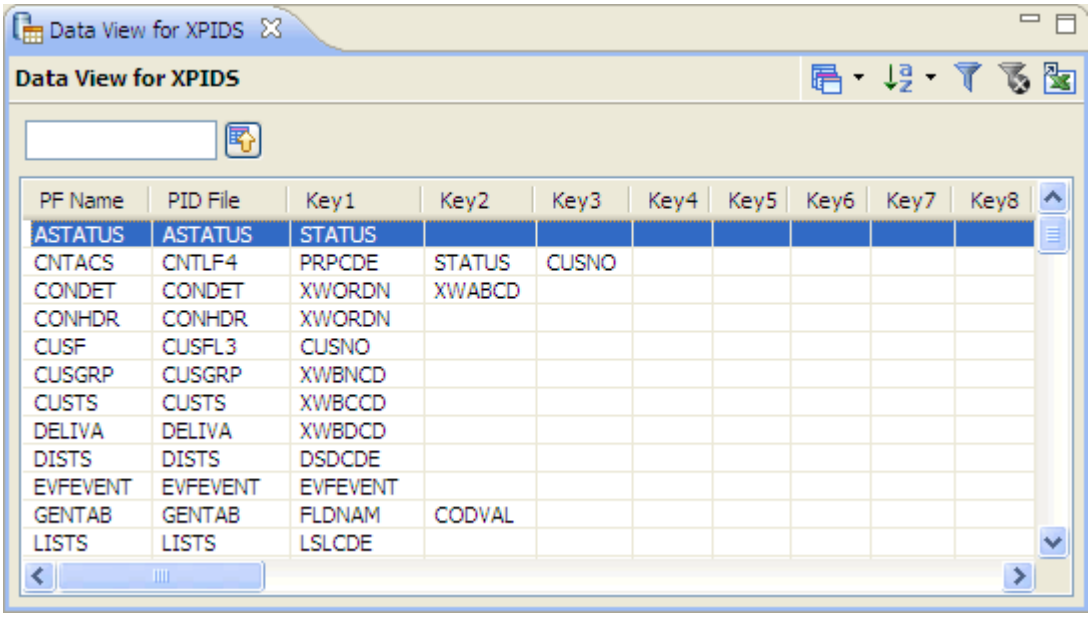


Entities

Under the Data Dictionary, the first submenu option is **Entities**. On selecting this option, the Primary Identifiers view will be displayed. This is also the default view when the Data Dictionary is invoked from X-Analysis.

The identification of the correct primary identifier is crucial to the building of an accurate data model. The primary identifier is determined by an examination of all the access paths for the file and is verified against the data in the file. All the primary identifiers are written to the **XPIDS** file.

Data View for XPIDS



PF Name	PID File	Key1	Key2	Key3	Key4	Key5	Key6	Key7	Key8
ASTATUS	ASTATUS	STATUS							
CNTACS	CNTLF4	PRPCDE	STATUS	CUSNO					
CONDET	CONDET	XWORDN	XWABCD						
CONHDR	CONHDR	XWORDN							
CUSF	CUSFL3	CUSNO							
CUSGRP	CUSGRP	XWBNCD							
CUSTS	CUSTS	XWBCCD							
DELIVA	DELIVA	XWBDCD							
DISTS	DISTS	DSDCDE							
EVFEVENT	EVFEVENT	EVFEVENT							
GENTAB	GENTAB	FLDNAM	CODVAL						
LISTS	LISTS	LSLCDE							

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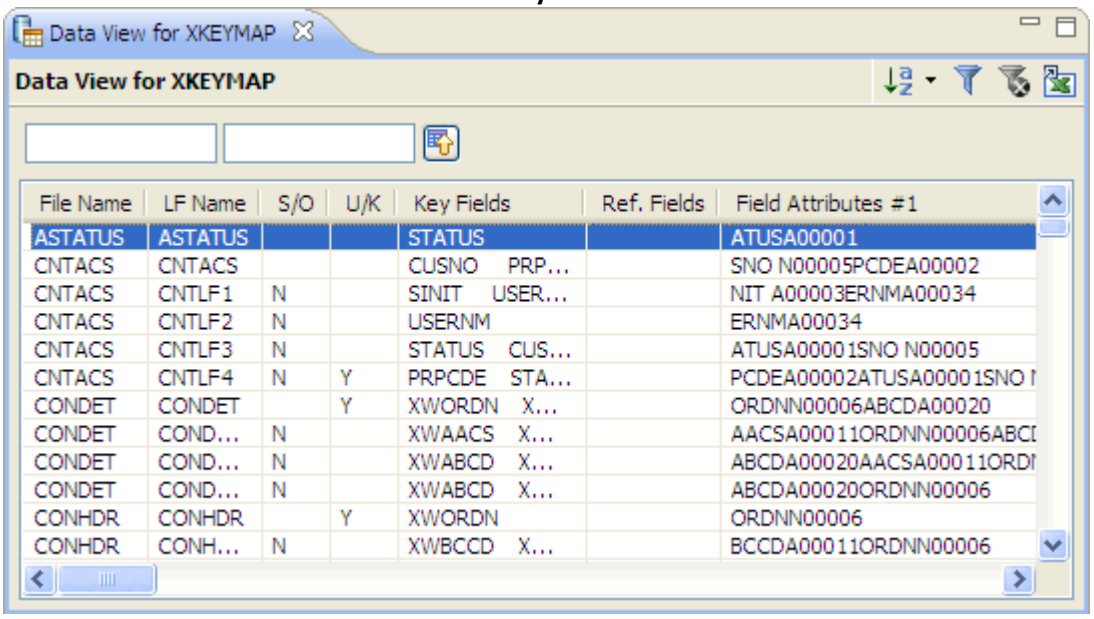
Access Paths

The second submenu option in the Data Dictionary is **Access Paths**. This file records all of the access paths available to each Physical File. There is one **XKEYMAP** record for each access path. The user can select the **Access Paths** option by clicking on the **Data Dictionary** icon.

Data Dictionary – Access Paths



File Name	LF Name	S/O	U/K	Key Fields	Ref. Fields	Field Attributes #1
ASTATUS	ASTATUS			STATUS		ATUSA00001
CNTACS	CNTACS			CUSNO PRP...		SNO N00005PCDEA00002
CNTACS	CNTLF1	N		SINIT USER...		NIT A00003ERNMA00034
CNTACS	CNTLF2	N		USERNM		ERNMA00034
CNTACS	CNTLF3	N		STATUS CUS...		ATUSA00001SNO N00005
CNTACS	CNTLF4	N	Y	PRPCDE STA...		PCDEA00002ATUSA00001SNO I
CONDET	CONDET		Y	XWORDN X...		ORDNN00006ABCDA00020
CONDET	COND...	N		XWAACS X...		AACSA00011ORDNN00006ABCI
CONDET	COND...	N		XWABCD X...		ABCDA00020AACSA00011ORDI
CONDET	COND...	N		XWABCD X...		ABCDA00020ORDNN00006
CONHDR	CONHDR		Y	XWORDN		ORDNN00006
CONHDR	CONH...	N		XWBCCD X...		BCCDA00011ORDNN00006

Up to 10 key fields can be associated with each field.

Fields

Fields is the third option present on the **Data Dictionary** menu. The user can click on this option to view information for every field in each file in the application database. All the field information extracted during the Data Modelling process is contained in the Data Dictionary file. Each field from each Physical File in **XPIDS** is listed. The metadata extracted can be interpreted and utilized by applications to read, write, and format the fields correctly.

On selecting the **Fields** option, the file fields' details are displayed as shown in the image below:

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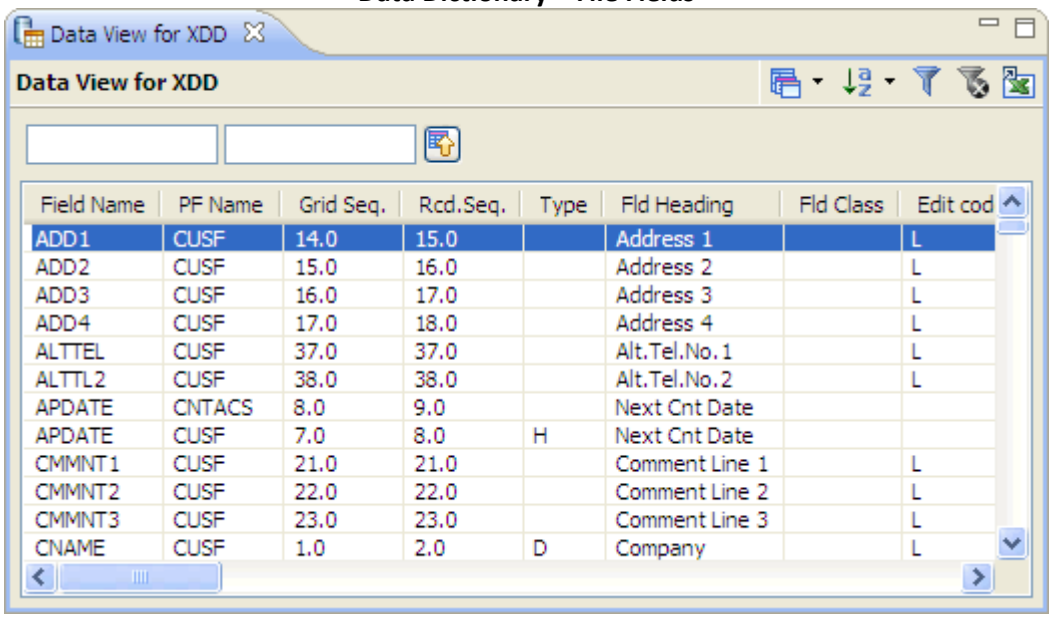
Data Dictionary – File Fields

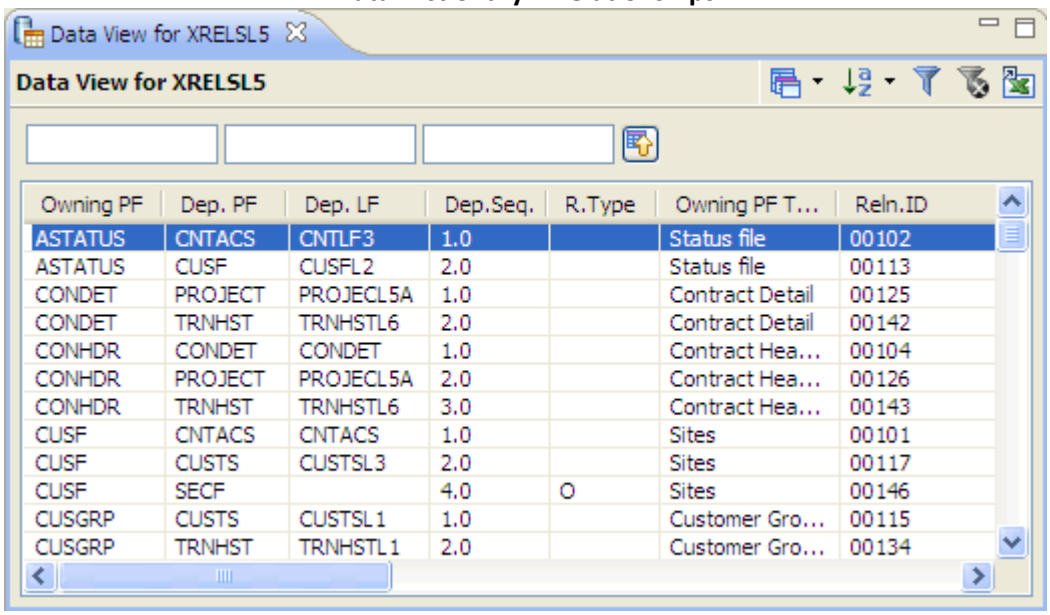


Field Name	PF Name	Grid Seq.	Rcd.Seq.	Type	Fld Heading	Fld Class	Edit cod
ADD1	CUSF	14.0	15.0		Address 1		L
ADD2	CUSF	15.0	16.0		Address 2		L
ADD3	CUSF	16.0	17.0		Address 3		L
ADD4	CUSF	17.0	18.0		Address 4		L
ALTTEL	CUSF	37.0	37.0		Alt.Tel.No.1		L
ALTTL2	CUSF	38.0	38.0		Alt.Tel.No.2		L
APDATE	CNTACS	8.0	9.0		Next Cnt Date		
APDATE	CUSF	7.0	8.0	H	Next Cnt Date		
CMMNT1	CUSF	21.0	21.0		Comment Line 1		L
CMMNT2	CUSF	22.0	22.0		Comment Line 2		L
CMMNT3	CUSF	23.0	23.0		Comment Line 3		L
CNAME	CUSF	1.0	2.0	D	Company		L

Relationships

The files contained in an application could be inter-related. For executing the data modelling procedure, it is imperative for a user to have information of all these relationships. The user can view these relationships by selecting the **Relationships** option from the Data Dictionary menu. This file records the relationships between all the Physical Files that form the Data Model.

Data Dictionary – Relationships



Owning PF	Dep. PF	Dep. LF	Dep.Seq.	R.Type	Owning PF T...	Reln.ID
ASTATUS	CNTACS	CNTLF3	1.0		Status file	00102
ASTATUS	CUSF	CUSFL2	2.0		Status file	00113
CONDET	PROJECT	PROJECL5A	1.0		Contract Detail	00125
CONDET	TRNHST	TRNHSTL6	2.0		Contract Detail	00142
CONHDR	CONDET	CONDET	1.0		Contract Hea...	00104
CONHDR	PROJECT	PROJECL5A	2.0		Contract Hea...	00126
CONHDR	TRNHST	TRNHSTL6	3.0		Contract Hea...	00143
CUSF	CNTACS	CNTACS	1.0		Sites	00101
CUSF	CUSTS	CUSTSL3	2.0		Sites	00117
CUSF	SECF		4.0	O	Sites	00146
CUSGRP	CUSTS	CUSTSL1	1.0		Customer Gro...	00115
CUSGRP	TRNHST	TRNHSTL1	2.0		Customer Gro...	00134

There are three types of relationships that can be identified:

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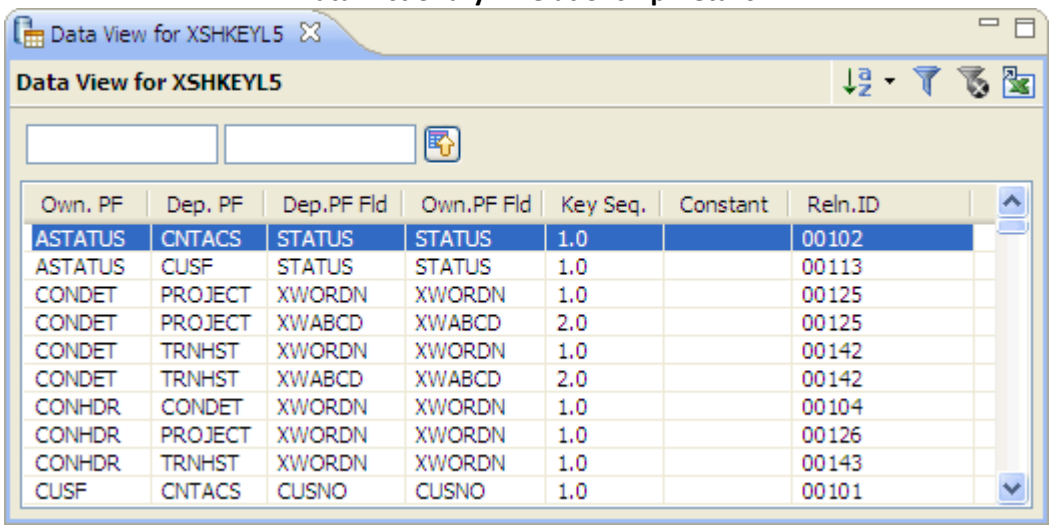
- Owns – PID to PID relationship
- Accesses – Access Path to Access Path relationship
- Refers to – Foreign key to PID relationship

Relationship Details

Relationship Details is the last option on the Data Dictionary menu. The detailed composition of every File-to-File relationship is available through this option. This file is the counterpart to XRELS and every File-to-File relationship is recorded in XRELS. XSHKEYS describes each of the Field-to-Field relationships that make up these XRELS relationships.

The user can choose the **Relationship Details** option by clicking on the **Data Dictionary** icon. The following screenshot displays the Relationship Details.

Data Dictionary – Relationship Details



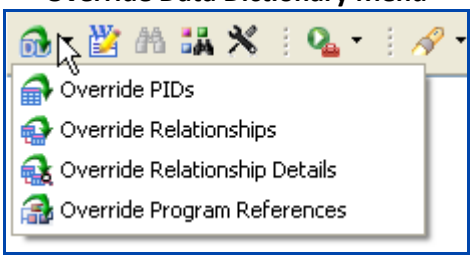
Own. PF	Dep. PF	Dep.PF Fld	Own.PF Fld	Key Seq.	Constant	Reln.ID
ASTATUS	CNTACS	STATUS	STATUS	1.0		00102
ASTATUS	CUSF	STATUS	STATUS	1.0		00113
CONDET	PROJECT	XWORDN	XWORDN	1.0		00125
CONDET	PROJECT	XWABCD	XWABCD	2.0		00125
CONDET	TRNHST	XWORDN	XWORDN	1.0		00142
CONDET	TRNHST	XWABCD	XWABCD	2.0		00142
CONHDR	CONDET	XWORDN	XWORDN	1.0		00104
CONHDR	PROJECT	XWORDN	XWORDN	1.0		00126
CONHDR	TRNHST	XWORDN	XWORDN	1.0		00143
CUSF	CNTACS	CUSNO	CUSNO	1.0		00101

OVERRIDE DATA DICTIONARY

The elaborate Data Modelling process demands the presence of several details. The drop-down icon for this option is present alongside the **Data Dictionary** icon on the X-Analysis toolbar. When the user clicks on this icon, he can access detailed information for every field in each file in the application database. Much of this data is the standard metadata extracted for each file and stored on the **XDD** file – for instance field and column names, field size and field type. Thus, record metadata is readily available for use by other applications.

The main **Override Data Dictionary** submenu options are:

Override Data Dictionary Menu



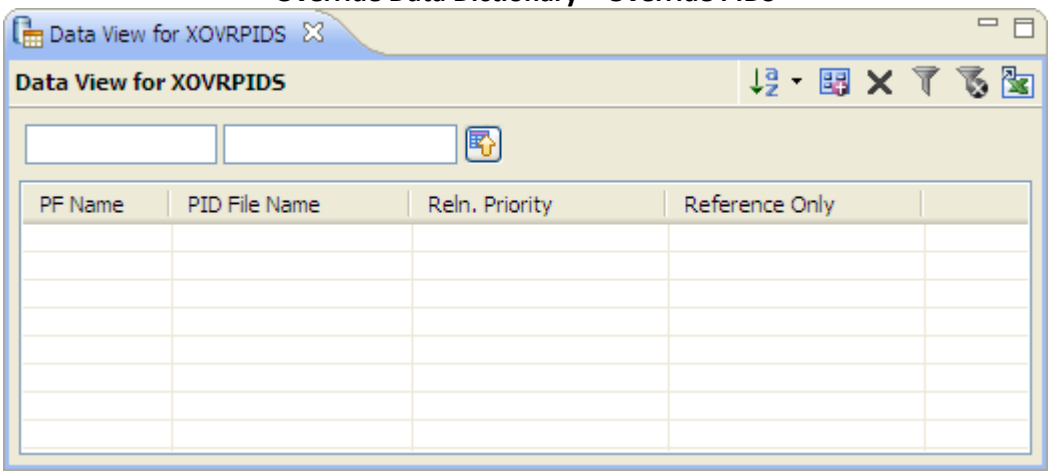
Override PIDS

The first submenu option is **Override PIDs**. On clicking this option, the **XOVRPIDS** file which contains all the override entries for the XPIDS file, is displayed.

Field	Field Name	Size	Description
Physical File Name	OVRPF	10A	
PID File Name	OVRPID	10A	Access Path for file to be used as the PID
Relationship Priority	OVRPTY	1A	Only 1, 2 & 3 signify; 1 is the highest – this value is used when determining which "owner" file is to supply the descriptor for screen layouts.
Reference Only	OVRRFO	1A	If this relationship is reference only, enter "y".

The subsequent screenshot displays the Override PIDs fields.

Override Data Dictionary – Override PIDS



Override Relationships

Override Relationships is the next option on the **Override Data Dictionary** menu. Selecting this option displays the **XOVRRELS** file, which holds the override entries for **XRELS**.

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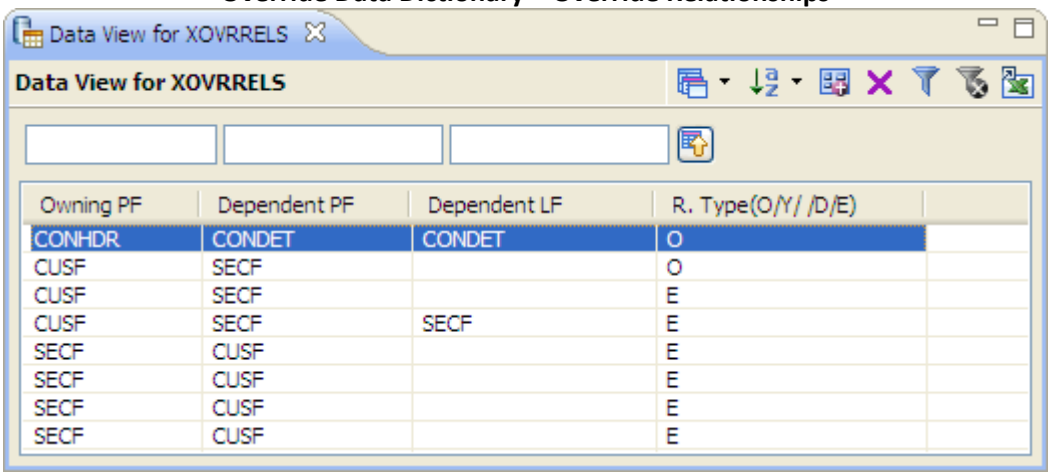
Field	Field Name	Size	Description
Owning PF	OVROPF	10A	
Dependent PF	OVRDPF	10A	
Dependent LF	OVRDLF	1A	
Reference Type	OVRRFO	1A	

The following screen displays the Override Relationships window.

Override Data Dictionary – Override Relationships



Override Relationship Details

The **XOVRSHKS** file, which contains the override entries for the **XSHKEYS** file is displayed when the user clicks on the **Override Relationship Details** submenu option available on the **Override Data Dictionary** menu.

Field	Field Name	Size	Description
File	OVRFIL	10A	
Match File	OVRMFIL	10A	
Key Seq.	OVRSEQ	5P 2	
Field	OVRFLD	10 A	
Match Field	OVRMFLD	10 A	
Constant	OVRCON	20 A	
Relationship ID	OVRRLID	5P 0	

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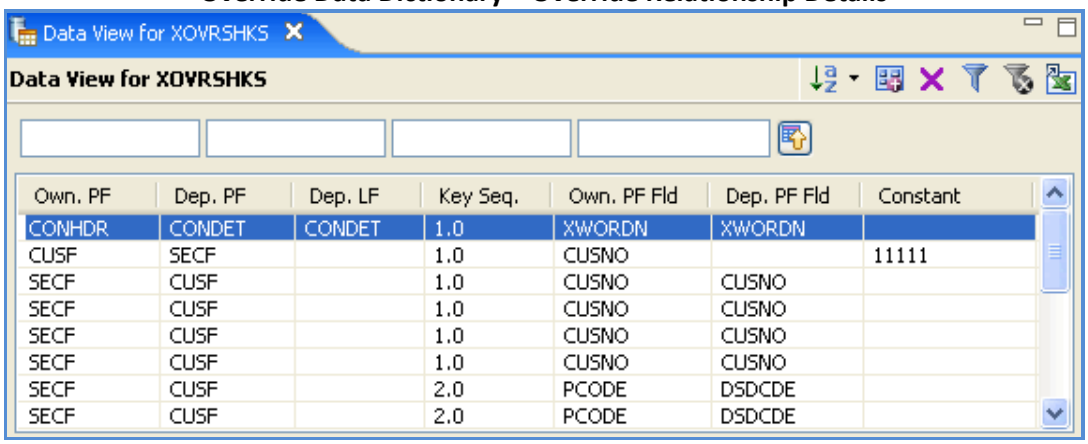
Override Data Dictionary – Override Relationship Details



Own. PF	Dep. PF	Dep. LF	Key Seq.	Own. PF Fld	Dep. PF Fld	Constant
CONHDR	CONDET	CONDET	1.0	XWORDN	XWORDN	
CUSF	SECF		1.0	CUSNO		11111
SECF	CUSF		1.0	CUSNO	CUSNO	
SECF	CUSF		1.0	CUSNO	CUSNO	
SECF	CUSF		1.0	CUSNO	CUSNO	
SECF	CUSF		1.0	CUSNO	CUSNO	
SECF	CUSF		2.0	PCODE	DSDCDE	
SECF	CUSF		2.0	PCODE	DSDCDE	

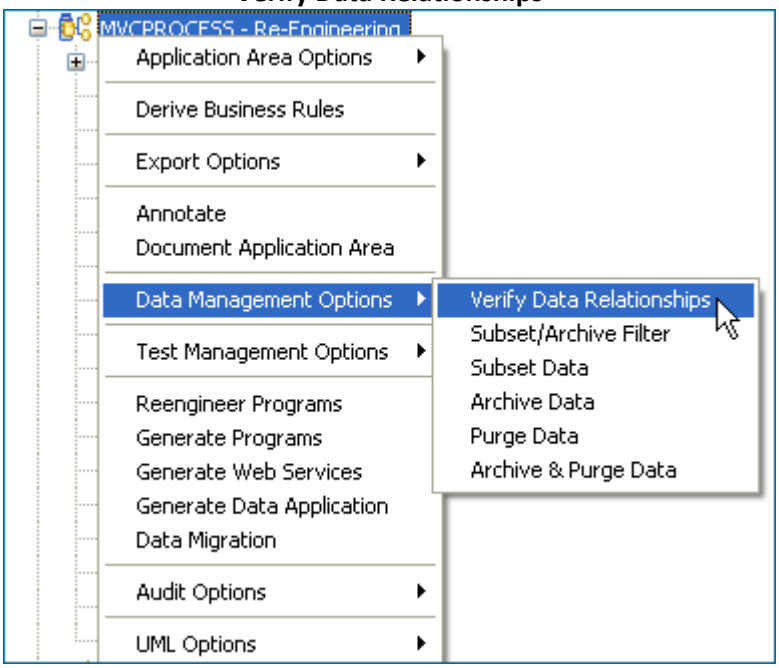
Override Program References

For updating program references, a user can select the last of the Override options, which is **Override Program References**. On choosing this option, the user can add or remove program references for a specific object.

VERIFY DATA RELATIONSHIPS

The **Verify Data Relationships** option is a submenu option of the **Data Management Options**, which is available on the context menu of a selected application area. Clicking the **Verify Data Relationships** option brings up a dialog showing the selected cross-reference library and application area.

Verify Data Relationships



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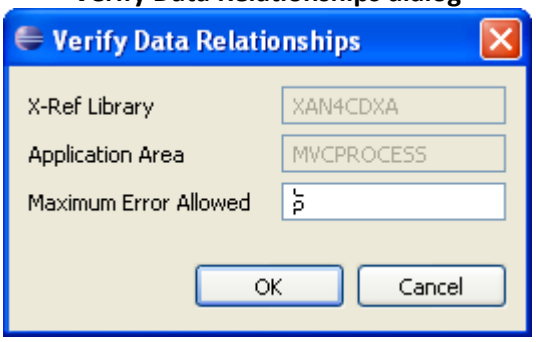
This presents a dialog showing the selected cross-reference library and the application area.

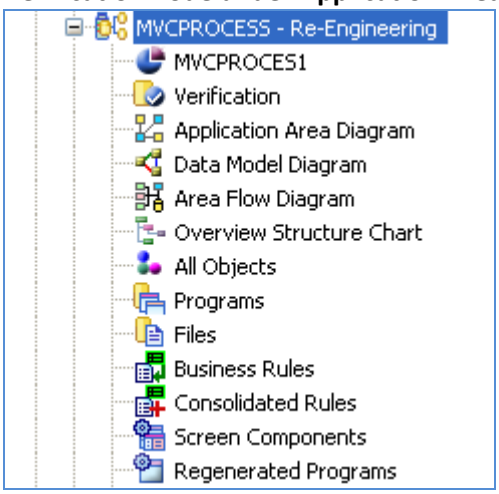
Verify Data Relationships dialog



It prompts for maximum records in error to be reported, showing the primary keys and the foreign keys of each record that breaches a given relationship. This can range from 1 to 999.

If the request is successful then the job gets submitted and the job details are displayed. On completion, a **Verification** node gets added under the application area.

Verification node under Application Area



Verification Process

The **Verify Data Relationships** option submits the **XVERIFY** command in batch. The **XVERIFY** command uses the data model constructed by re-engineering, to automatically verify that all application data satisfies the relationships deduced by the data model.

The product examines each data record in turn to see if its referential integrity relationships are satisfied. Each integrity relationship that is breached is separately reported on in a comprehensive audit print produced by the product.

This command is used to verify the data model against the data in the database.

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Parameters

The parameters passed internally to the **XVERIFY** command are:

Re-engineering Function Library

It is the library which contains the data model and application-specific files created by the command **XA4MODEL**. This is the name of the library that was entered as the Function Library on the **XA4MODEL** command.

Database Library Name

The library name, which contains the application database files. The command submitted with the value ***LOADLIB**, implying, each database file should be located in the same library used when **XA4MODEL** was run.

X-Analysis Application Area

The command uses the application area, on which this option is invoked, to control which files in the data model should be verified. Only relationships among files in the specified application area will be verified. Since an application area has been specified, the X-Analysis cross-reference library too is passed as parameter to the command.

Run Mode

The Run Mode parameter is passed as ***REPORT**, implying, generate a report showing the primary keys and the foreign keys of each record that breaches a given relationship up to a maximum number for each relationship as specified by the Maximum records parameter.

Maximum Records

If you have selected a run mode of ***REPORT** then **XVERIFY** will print a report showing the primary keys and the foreign keys of each record that breaches a given relationship. This parameter allows you to specify the maximum number of records printed for each relationship.

If a dependent file contains fewer than the maximum number of records specified (but more than zero records) and all the records breach the relationship, then that relationship will be updated.

Verification Report

Opt for the context menu on the **Verification** node under the selected application area, and then select the **Orphaned Records** option. This generates a report displaying the primary keys and the foreign keys of each record that breaches a given relationship.

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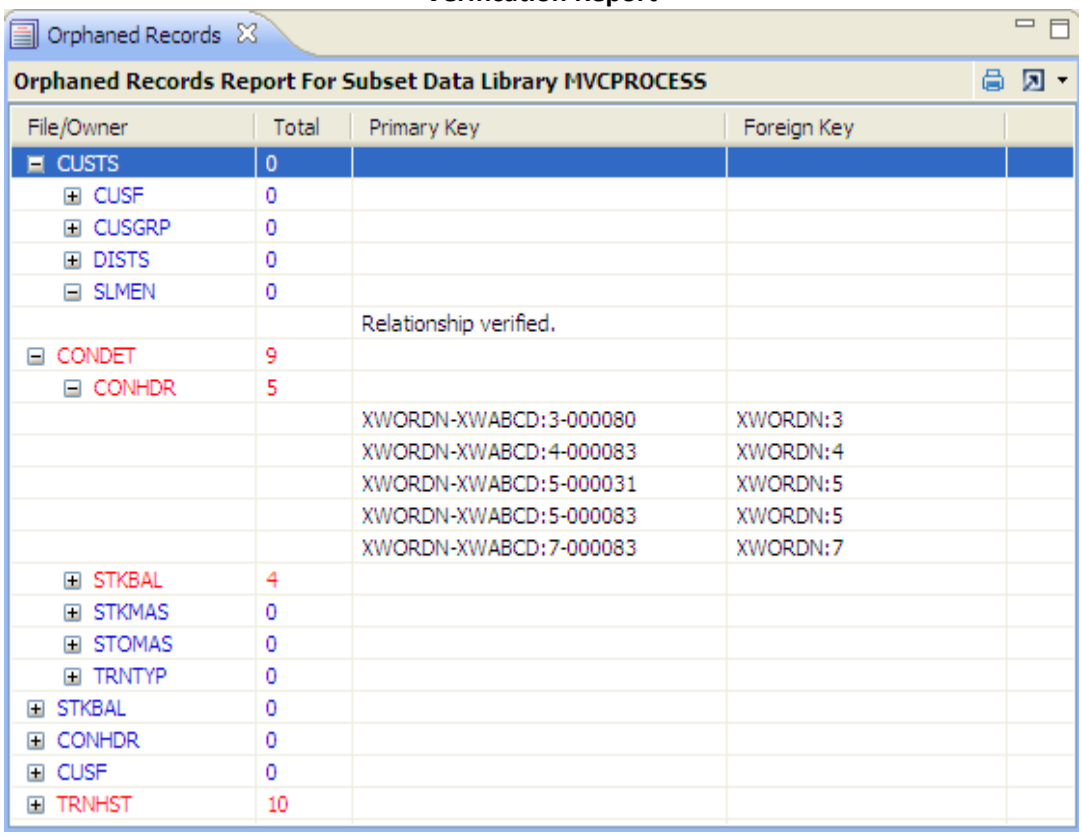
Verification Report

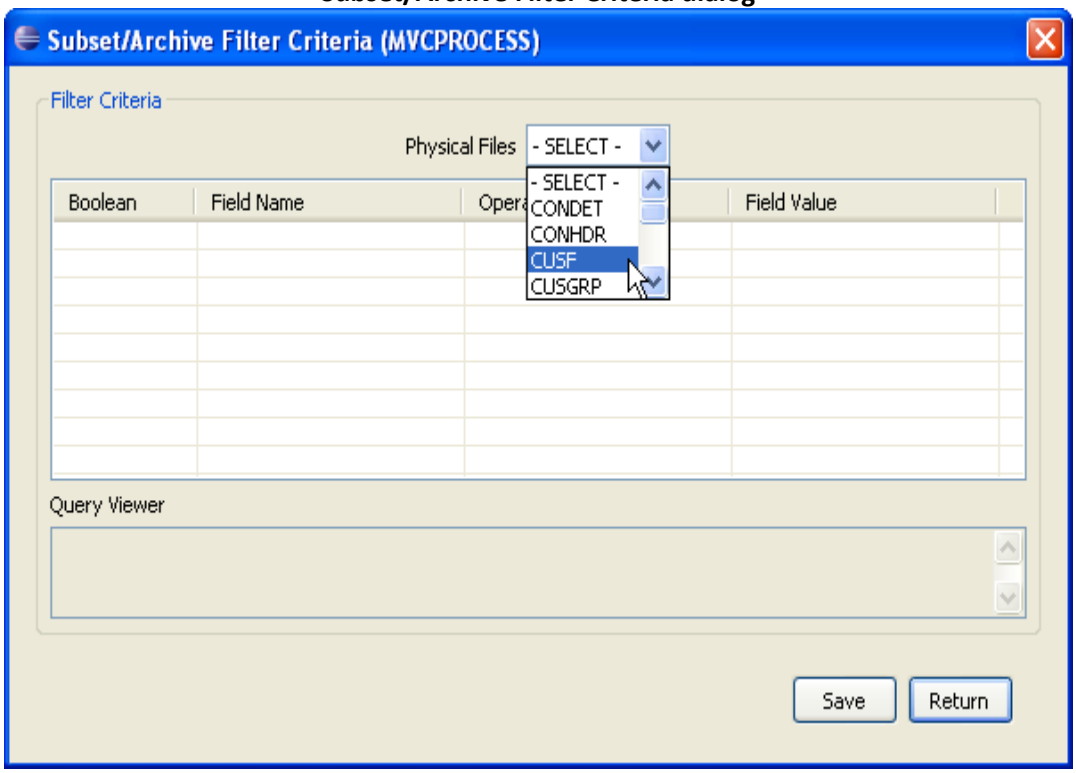


File/Owner	Total	Primary Key	Foreign Key
CUSTS	0		
CUSF	0		
CUSGRP	0		
DISTS	0		
SLMEN	0		
		Relationship verified.	
CONDET	9		
CONHDR	5		
		XWORDN-XWABCD:3-000080	XWORDN:3
		XWORDN-XWABCD:4-000083	XWORDN:4
		XWORDN-XWABCD:5-000031	XWORDN:5
		XWORDN-XWABCD:5-000083	XWORDN:5
		XWORDN-XWABCD:7-000083	XWORDN:7
STKBAL	4		
STKMAS	0		
STOMAS	0		
TRNTYP	0		
STKBAL	0		
CONHDR	0		
CUSF	0		
TRNHST	10		

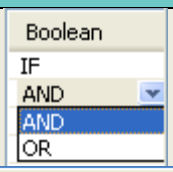
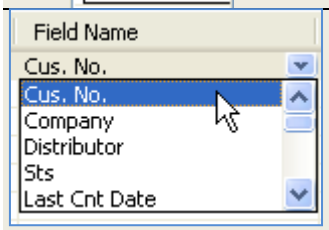
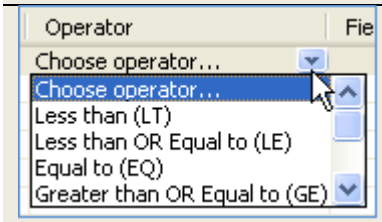
SUBSET/ARCHIVE FILTER

The subset selection criteria can be understood as the filter criteria specified on the Physical File(s) under an application area to select records to subset. On the **Subset/Archive Filter Criteria** dialog, pick the file in the drop-down to add/update filter criteria.

Subset/Archive Filter Criteria dialog



This lists the filter criteria defined on the file, if any. An add row is provided to add a new criterion.

Filter Criterion	Description
	**Boolean Column** The default value is 'IF'. For the second line, one can select from AND/OR.
	**Field Name Column** This column lists the fields of the Physical File picked. Pick the field on which the criterion is to be created.
	**Operator Column** Pick the operator to apply

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Filter Criterion	Description
Field Value	**Field Value** Supply the field value against which the field is to be compared.

Click the **Save** button to save the filter criteria. Click **Return** to present the display dialog, listing the filter criteria specified for the application area.

SUBSET DATA

The **Subset Data** option creates complete test data subsets from live data based upon existing application data model. Subset Data uses the data model constructed by X-Model to produce test data sets that satisfy all the constraints of the data model. The product first takes a specified number of records from each client file, and then examines each data modelling relationship in turn to check that all referenced records are also included.

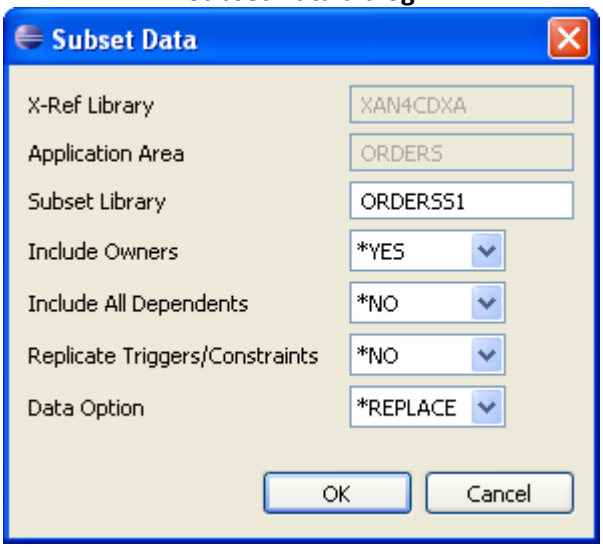
Creating test data sets is a three-stage process.

- Define the application area using the **X4WRKAPP**/X-Analysis.
- Define the filter using X-Analysis.
- Take the **Subset Data** option on the application area.

Creating Subset Data

Select the application area ORDERS from the tutorial application, XAN4CDXA. Select the **Subset Data** option from the **Data Management Options** submenu, available on the context menu on application areas. The Subset Data option brings up the **Subset Data** dialog, as shown below:

Subset Data dialog



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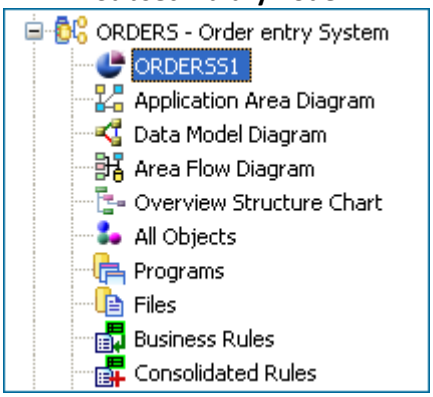
The **Subset Data** dialog prompts for the following options:

- **Subset Library:** Library to hold the subset records
- **Include Owners:** Select from *YES (default value), *NO, *ALL
- **Include All Dependents:** Select from *NO (default value), *YES, *ALL
- **Replicate Triggers/Constraints:** Select from *NO (default value), *Yes
- **Data Option:** Select from *REPLACE (default value), *ADD

After making the choices, click **OK** to execute the batch server command **XSUBAREA**. This produces the subset library, as the name specified in the **Subset Data** dialog. The records on the file obey the subset filter criteria specified on the files under the application area. This also adds the subset library – **ORDERSS1** as a node under the application area node in the navigation view.

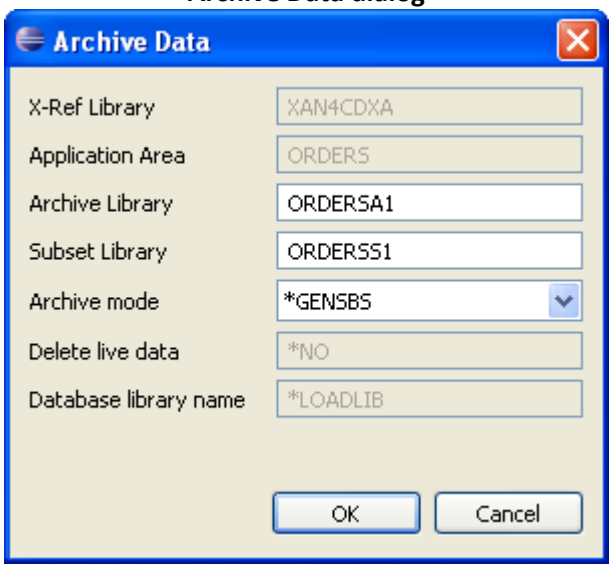
Subset Library node



ARCHIVE DATA

According to its name, the **Archive Data** option helps the user in archiving data, thus supporting application development and maintenance work. On choosing the option from the **Data Management Options** submenu, the following dialog is invoked.

Archive Data dialog

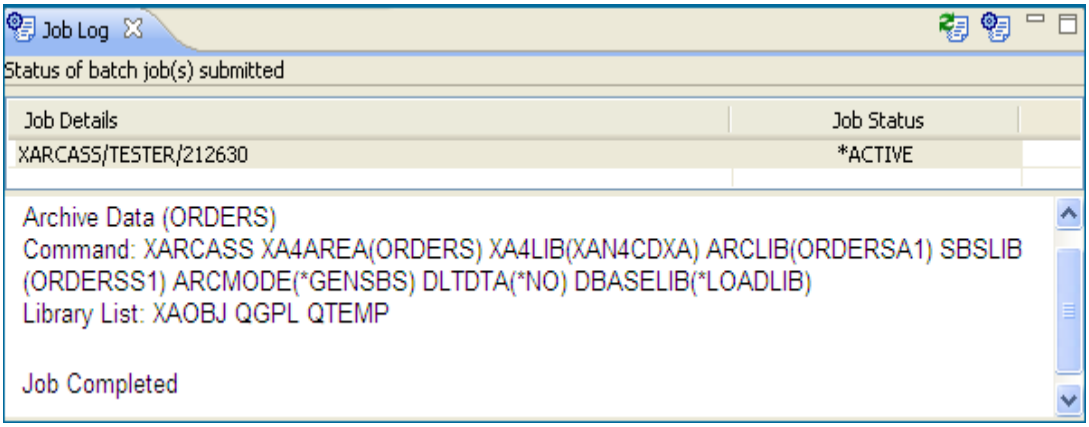


The dialog prompts the user to supply the following details:

- **Archive Library:** Name of the Archive Library
- **Subset Library:** Name of the Subset Library
- **Archive mode:** Select from *GENSBS (default value), *ARCDTA, *BOTH

When the user clicks **OK** after providing the details, a batch job is submitted. On the execution of the batch job, the job details appear on screen as is shown below:

Batch Job details



PURGE DATA

The user can use the **Purge Data** option to eliminate superfluities, and further streamline the data. On selecting this option from the **Data Management Options** submenu, the following dialog with available details is invoked:

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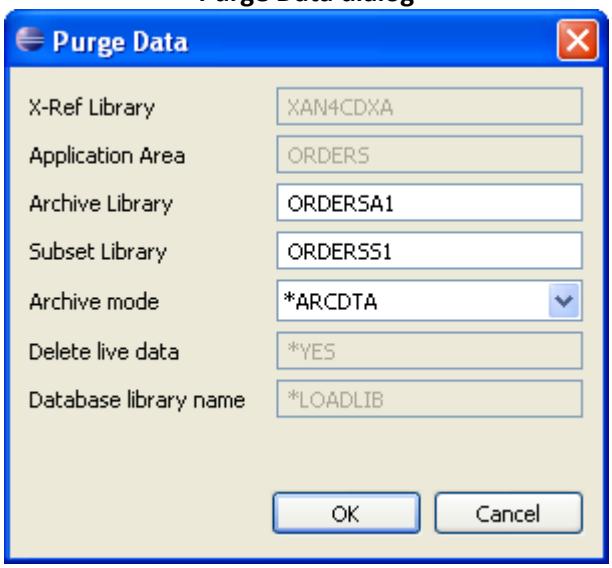
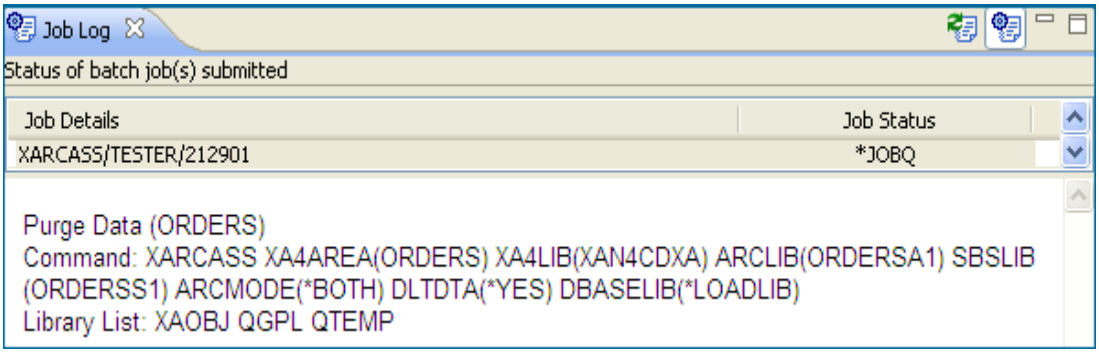
Purge Data dialog



The **Purge Data** dialog is the same as the **Archive Data** dialog. However, note that the default Archive mode is *ARCDTA (which the user can change to *BOTH), and the Delete live data is pre-set as *YES. When the user clicks **OK**, a batch job is submitted and the details appear on screen as shown below:

Batch Job details



ARCHIVE & PURGE DATA

When the user chooses the **Archive & Purge Data** option from the **Data Management Options** submenu, he invokes the following dialog (similar to the **Subset/Filter Criteria** dialog).

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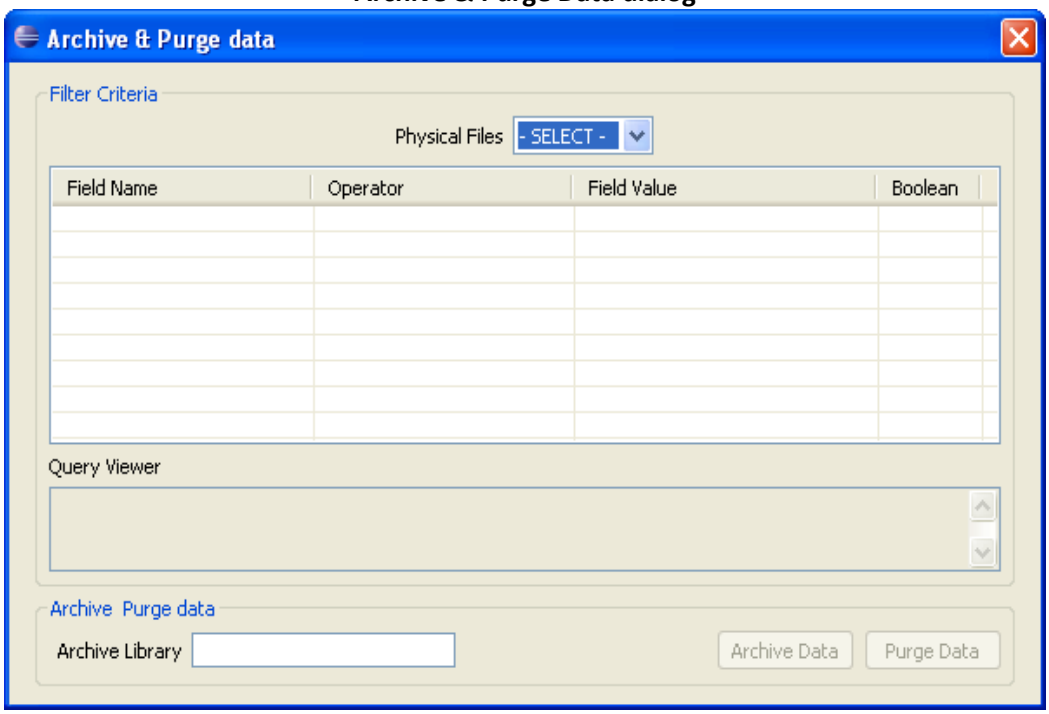
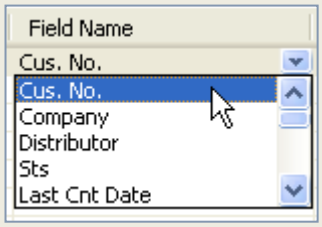
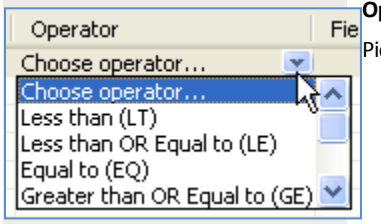
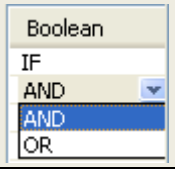
Archive & Purge Data dialog



Filter Criterion	Description
	**Field Name Column** This column lists the fields of the Physical File picked. Pick the field on which the criterion is to be created.
	**Operator Column** Pick the operator to apply.
	Field value Supply the field value against which the field is to be compared.
	**Boolean Column** The default value is 'AND'. The other option is 'OR'.

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Exporting & Printing

Modern software design tools frequently offer the facility to re-engineer a data model or entity relationship diagram from an existing database. This is usually done over an Open Database Connectivity (ODBC) connection and relies on the metadata held within a database to describe the relationships between tables. These tools are often unable to re-engineer an accurate data model from an existing DB2 database because it predates the database features that the tool relies on. You can use the X-Analysis data model to bridge this gap and import your data model into other tools.

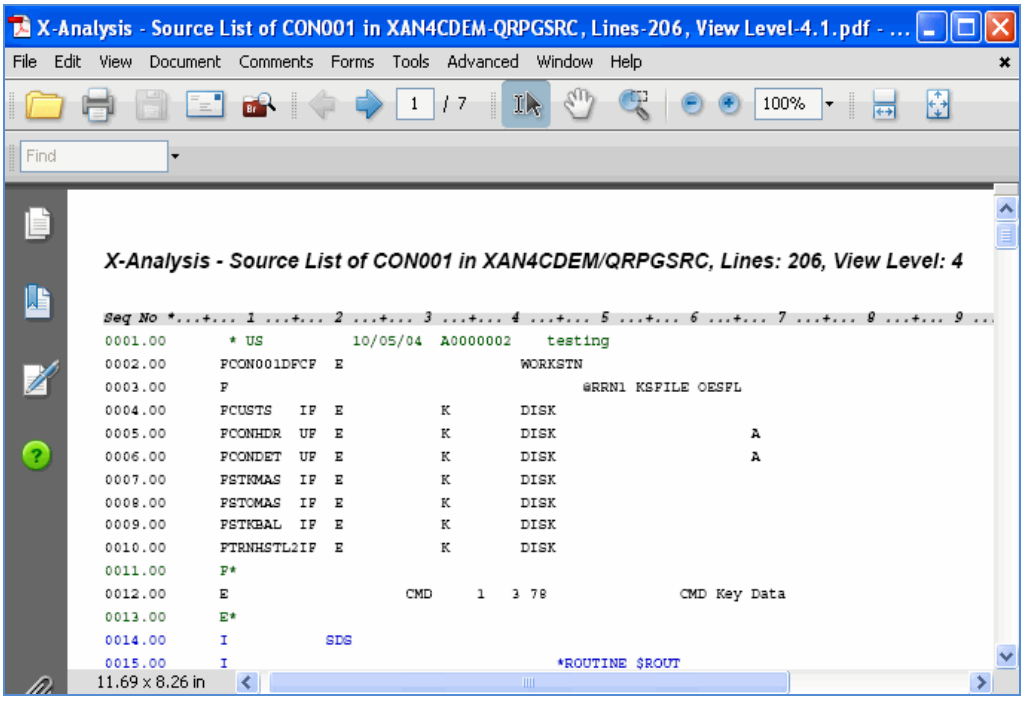
X-Analysis provides various export options for exporting diagrams and technical details directly to applications such as PDF/Microsoft Word or Microsoft Visio.

The interface to PDF/Microsoft Word is sophisticated enough to automatically produce detailed and structured documents that have Contents & Index pages, chapters, sections and all of the screens available in X-Analysis, displayed with a simple selection wizard. Existing documentation, object/field annotation can be included in the exported PDF/Microsoft Word documents.

EXPORT TO PDF

On selecting the **Export to PDF** option from the **Export Options** icon available on the toolbar, the displayed content gets exported to PDF.

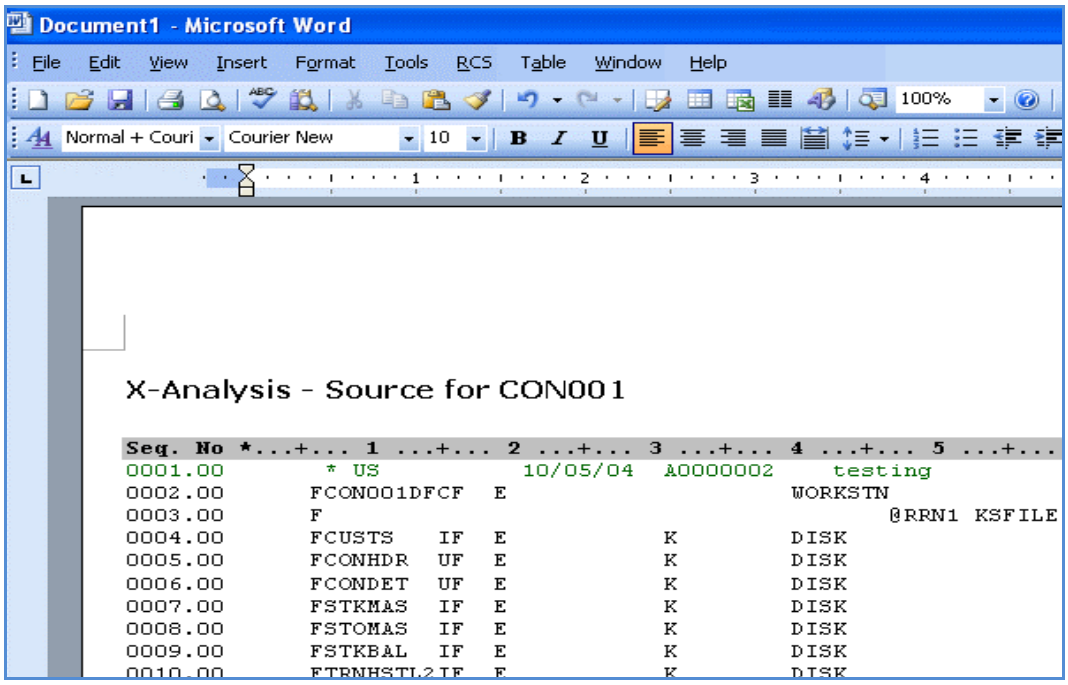
PDF view of current Source Code


X-Analysis - Source List of CON001 in XAN4CDEM-QRPGSRC, Lines-206, View Level-4.1.pdf - ...
File Edit View Document Comments Forms Tools Advanced Window Help
1 / 7
100%
Find
X-Analysis - Source List of CON001 in XAN4CDEM/QRPGSRC, Lines: 206, View Level: 4
Seq No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8 ...+... 9 ...
0001.00 * US 10/05/04 A0000002 testing
0002.00 FCON001DFCF E WORKSTN
0003.00 F @RRN1 KSFILE OESFL
0004.00 FCUSTS IF E K DISK
0005.00 FCONHDR UF E K DISK A
0006.00 FCONDET UF E K DISK A
0007.00 FSTKMAS IF E K DISK
0008.00 FSTOMAS IF E K DISK
0009.00 FSTKBAL IF E K DISK
0010.00 FTRNHSTL2IF E K DISK
0011.00 F*
0012.00 E CMD 1 3 78 CMD Key Data
0013.00 E*
0014.00 I SDS
0015.00 I *ROUTINE $ROUT
11.69 x 8.26 in

EXPORT TO MICROSOFT WORD

On selecting the **Export to Microsoft Word** option from the **Export Options** icon available on the toolbar, Microsoft Word gets invoked and the content displayed gets exported to Microsoft Word.

Microsoft Word view of Current Source Code


Document1 - Microsoft Word
File Edit View Insert Format Tools RCS Table Window Help
Normal + Couri Courier New 10
X-Analysis - Source for CON001
Seq. No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+...
0001.00 * US 10/05/04 A0000002 testing
0002.00 FCON001DFCF E WORKSTN
0003.00 F @RRN1 KSFILE
0004.00 FCUSTS IF E K DISK
0005.00 FCONHDR UF E K DISK
0006.00 FCONDET UF E K DISK
0007.00 FSTKMAS IF E K DISK
0008.00 FSTOMAS IF E K DISK
0009.00 FSTKBAL IF E K DISK

EXPORT TO MICROSOFT EXCEL

X-Analysis displays various lists. All lists have the options to export data to MS Excel and MS Word. The **Export Options** drop-down icon appears on the associated toolbar.

Selecting **Export to Excel** will invoke MS Excel and export current source code, as displayed below:

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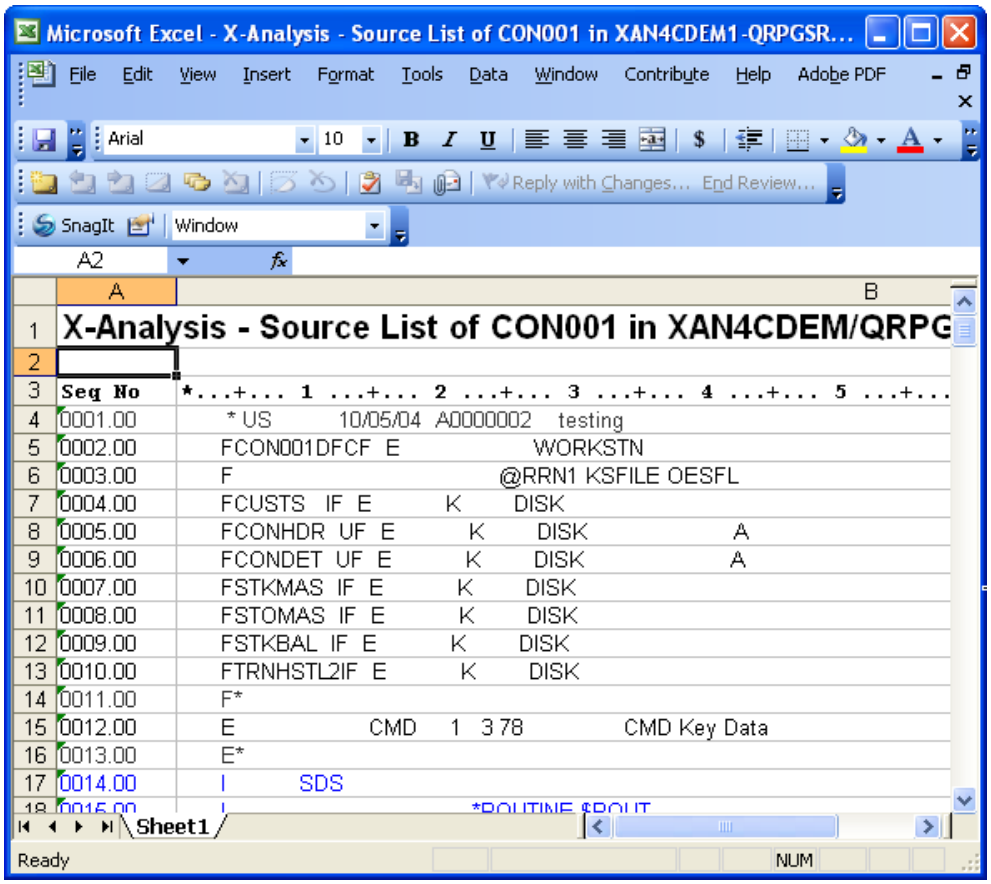
Microsoft Excel view of Current Source Code


Microsoft Excel - X-Analysis - Source List of CON001 in XAN4CDEM1-QRPGSR...
File Edit View Insert Format Tools Data Window Contribute Help Adobe PDF
Arial 10
Reply with Changes... End Review...
SnagIt Window
A2
X-Analysis - Source List of CON001 in XAN4CDEM/QRPG
Seq No *...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+...
0001.00 * US 10/05/04 A0000002 testing
0002.00 FCON001DFCF E WORKSTN
0003.00 F @RRN1 KSFILE OESFL
0004.00 FCUSTS IF E K DISK
0005.00 FCONHDR UF E K DISK A
0006.00 FCONDET UF E K DISK A
0007.00 FSTKMAS IF E K DISK
0008.00 FSTOMAS IF E K DISK
0009.00 FSTKBAL IF E K DISK
0010.00 FTRNHSTL2IF E K DISK
0011.00 F*
0012.00 E CMD 1 3 78 CMD Key Data
0013.00 E*
0014.00 I SDS
Sheet1
Ready
NUM

EXPORT TO FLOWCHART

X-Analysis generates Flowcharts for RPG, RPGLE, and COBOL programs. It also generates Process Flow Diagrams for CL programs. The **Flowchart** option is enabled only in the source browser view. It generates the flowchart of the displayed program using MS Visio.

Each level of source (selected source member) has a different flowchart:

- Level 1-2 will have a Flowchart without any code
- Level 3-4 will have a Flowchart with code without blank lines, and with no comments
- Level 5 will have a Flowchart with full code and comments

In Level 1-2 the context menu on a shape in the Flowchart has the option: **View Source**

The **View Source** option displays the code for that section of the flowchart in the form of an HTML page.

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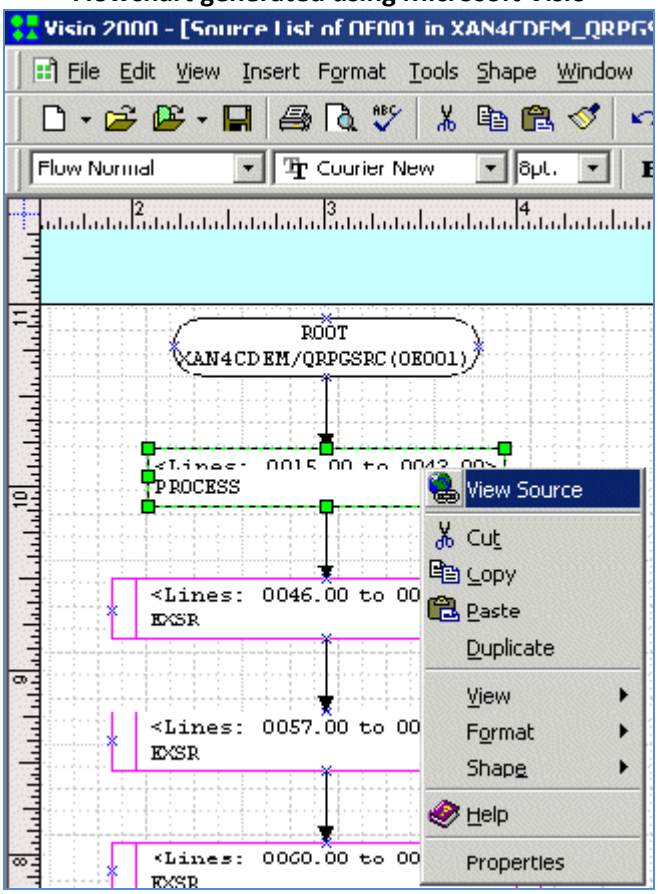
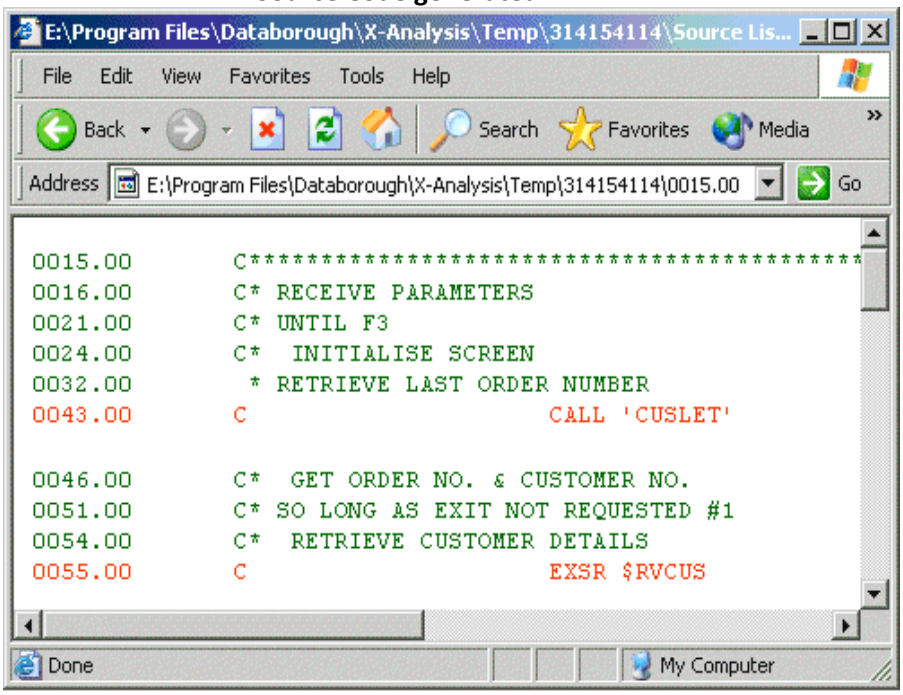
Flowchart generated using Microsoft Visio

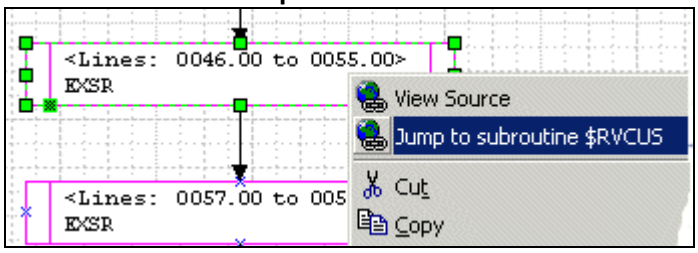


Source Code generated in HTML

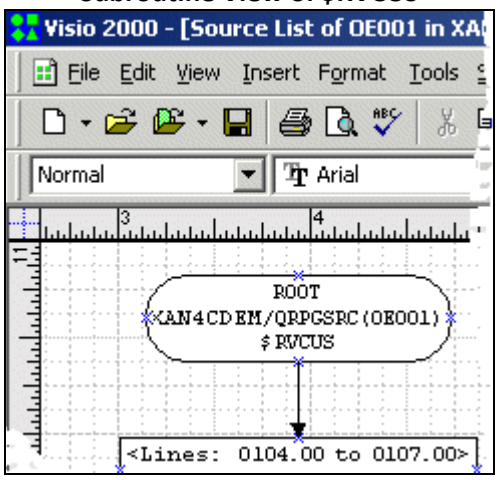


The right-click menu option **Jump to subroutine** on EXSR (Execute Subroutine) boxes opens the flowchart for the selected subroutine. This option is available at all levels.

Jump to Subroutine



Subroutine View of $RVCUS



PRINTING FROM X-ANALYSIS

X-Analysis allows printing of various List/Diagrams/Source members. The **Print** icon is available on the toolbar of various list/diagrams/source members.

Note that the Printer should be already configured.

EXPORT AS DDL FROM X-ANALYSIS

The option **Export as DDL** exports data model information as Data Definition Language (DDL) to the application folder. This information may be used by any database management system e.g. Oracle or SQL Server to create a similar data model.

The Data Definition Language (DDL) is a sequence of Structured Query Language (SQL) commands that defines the structure of a database. X-Analysis can export the structure of an application or application areas as DDL. The DDL can be used to recreate a database on any SQL database system. If your modelling tool does not support XML, then you can use the **Export as DDL** option. This option recreates your database as SQL tables with complete metadata information, required for a tool to re-engineer the new database over ODBC. Some third-party modelling tools allow importing SQL scripts or DDL files directly.

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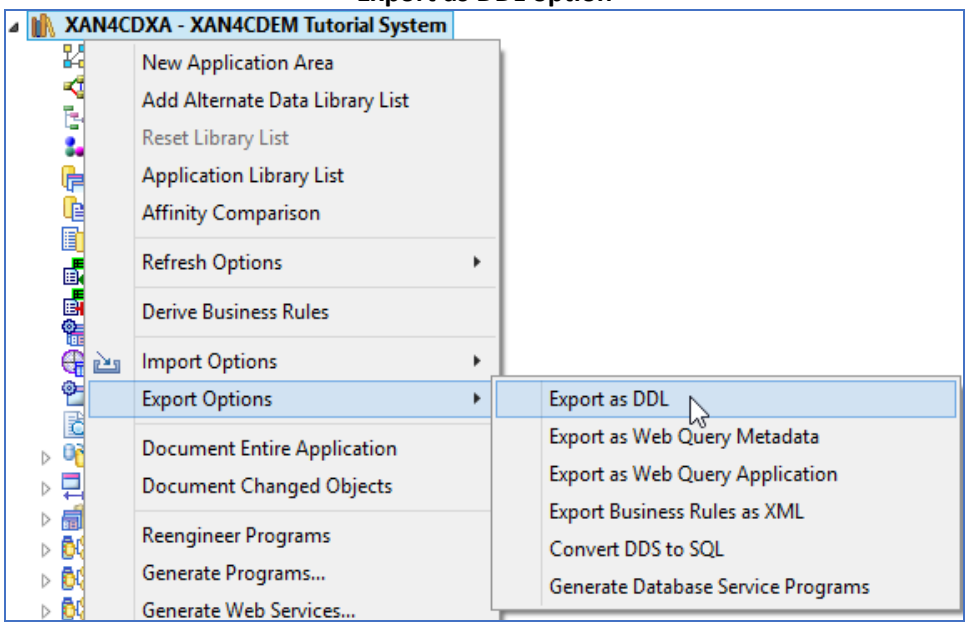
To export the DDL for the example Tutorial System (**XAN4CDXA**) data model:

1. Open the Tutorial System (**XAN4CDXA**) from the X-Analysis Client.

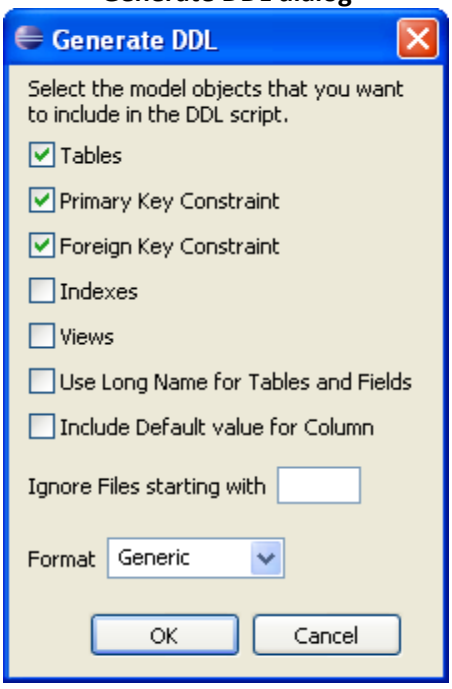
2. Opt for the context menu on **XAN4CDXA**, and then select the **Export as DDL** option from the **Export Options** submenu.

Export as DDL option



X-Analysis then invokes **Generate DDL** dialog as displayed below:

Generate DDL dialog



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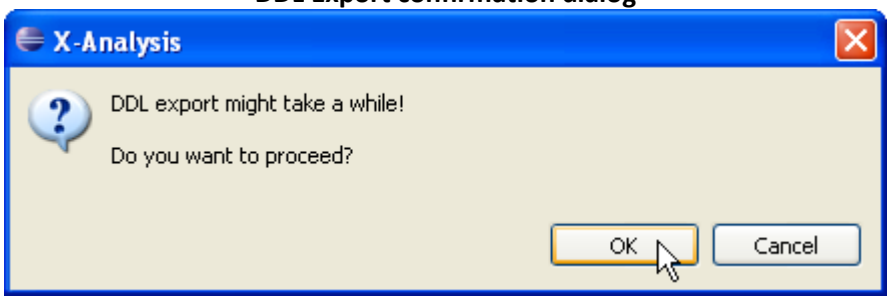
Make choices from the **Generate DDL** dialog and click **OK** to start the process.

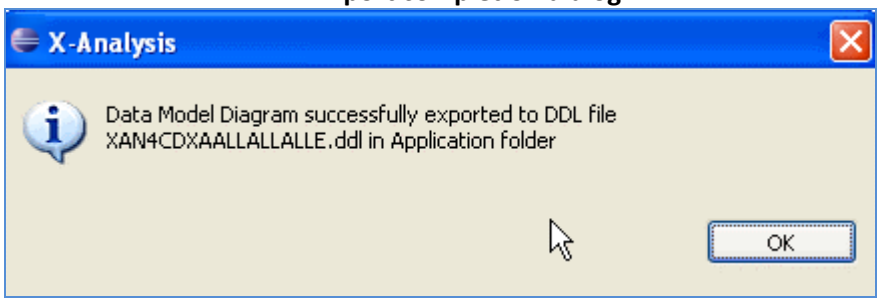
X-Analysis displays the following confirmation dialog to get confirmation from the user and start the process:

DDL Export confirmation dialog



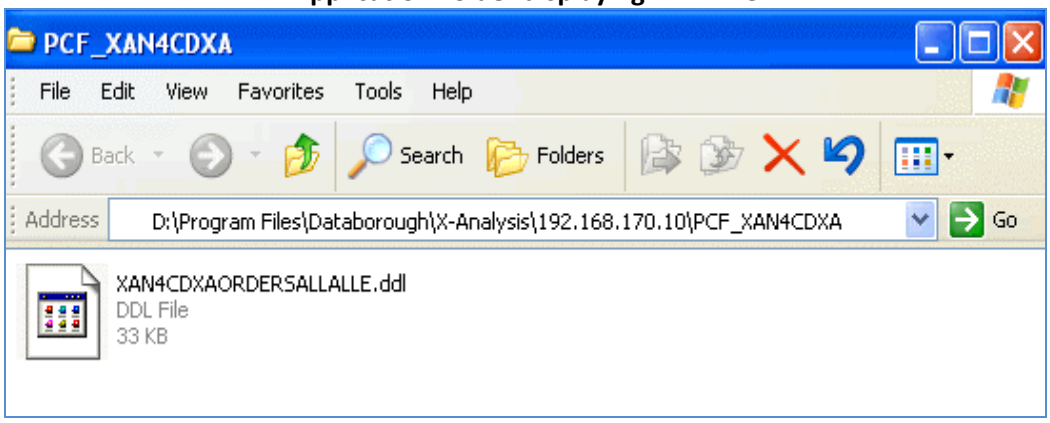
After the process is over, X-Analysis displays a successful message dialog.

DDL Export completion dialog



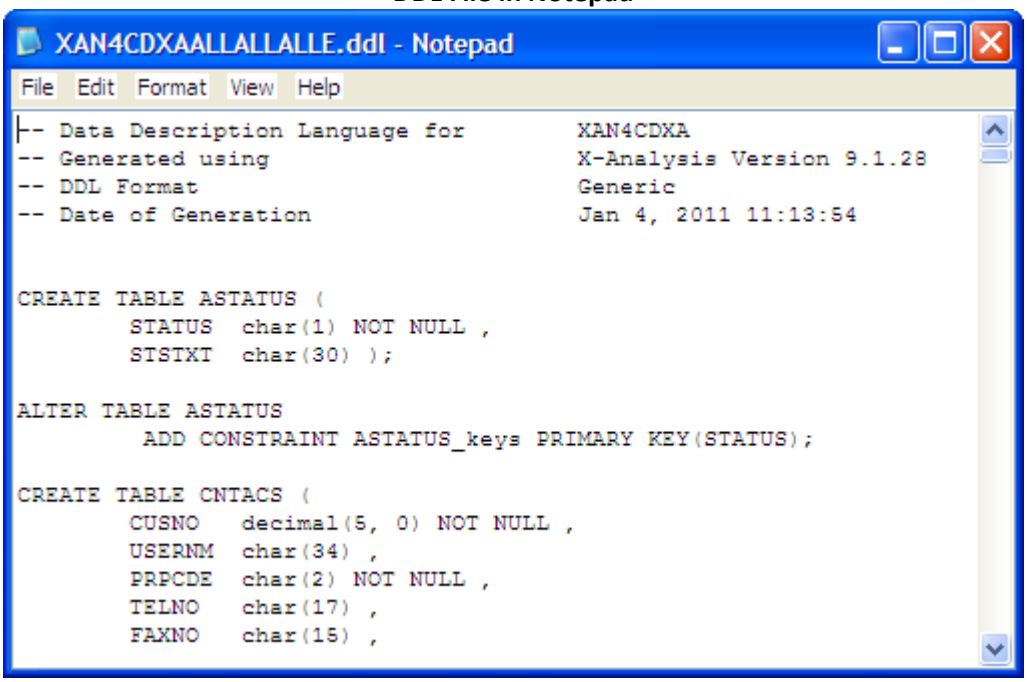
To view exported DDL statements, select menu **X-Analysis > Open Application Folder**. The generated DDL file is listed in this folder.

Application Folder displaying .DDL File



DDL is plain text and human readable so you can view the file in any text, such as Notepad. The snippet of the DDL statement generated is displayed below:

DDL File in Notepad


XAN4CDXAALLALLALLE.ddl - Notepad
File Edit Format View Help
-- Data Description Language for XAN4CDXA
-- Generated using X-Analysis Version 9.1.28
-- DDL Format Generic
-- Date of Generation Jan 4, 2011 11:13:54
CREATE TABLE ASTATUS (
STATUS char(1) NOT NULL ,
STSTXT char(30));
ALTER TABLE ASTATUS
ADD CONSTRAINT ASTATUS_keys PRIMARY KEY(STATUS);
CREATE TABLE CNTACS (
CUSNO decimal(5, 0) NOT NULL ,
USERNM char(34) ,
PRPCDE char(2) NOT NULL ,
TELNO char(17) ,
FAXNO char(15) ,

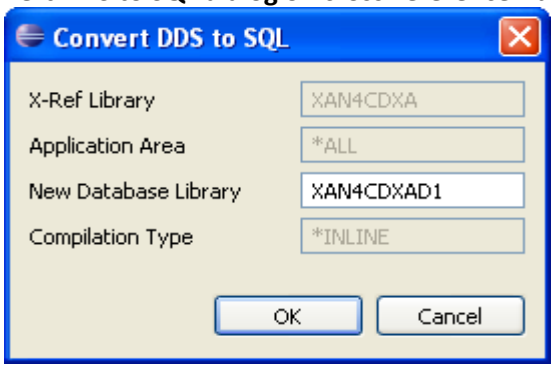
Note: The Export as DDL option is also available on application areas.

CONVERT DDS TO SQL

The **Convert DDS to SQL** option calls the IBM i command, **XDDSTOSQL** and submits the job in batch. This option is available on cross-reference library, Application Areas, and Physical Files (PF).

Opt for the context menu on the tutorial application, and then select the **Convert DDS to SQL** option from the **Export Options** submenu. The following dialog appears:

Convert DDS to SQL dialog on cross-reference library



Click **OK** to start the process of conversion.

Opt for the context menu on the application area **ORDERS** and select the **Convert DDS to SQL** option under the **Export Options** submenu. The following dialog appears:

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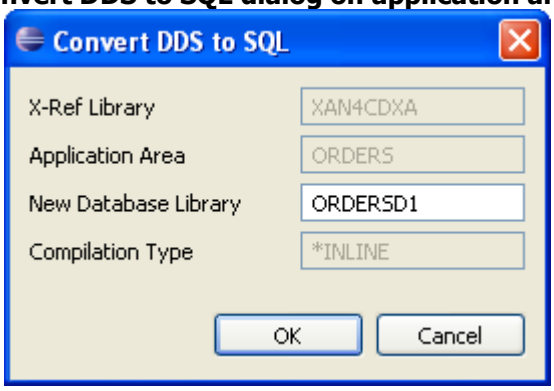
Convert DDS to SQL dialog on application area



The **New Database Library** contains the generated SQL Objects.

XDDSTOSQL command

The **XDDSTOSQL** command will initiate the following sequence:

- Generate DDL source members for the PFs. ("CREATE TABLE")
- Amend the DDL source members to specify the new library and SQL table name.
- Run RUNSQLSTM over the DDL source members to create the tables.
- Create a copy of original PFs as LFs pointing to the new SQL table.
- Generate DDL source members for the LFs. ("CREATE INDEX")
- Run RUNSQLSTM over the DDL source members to create the indexes.
- Create a copy of original LFs as LFs pointing to the new SQL table, but using the format of the PF. (These will use the access paths of the indexes.)
- Copy data from the original PFs to the new SQL tables.

Working of XDDSTOSQL command

With the help of the **XDDSTOSQL** command one can run all original application software immediately on the new database with no level check problems.

The DDL source for the SQL tables and indexes are stored in **QDDLSRC** in the X-Analysis library. The DDS source for the new LFs is stored in **QDDSSRC** in the X-Analysis library.

The new SQL tables are named using the maximum number of first characters from original PF name which together with the specified suffix are not more than ten characters. The new SQL indexes are named in the same way.

This suffix is specified in the data area **XSQLCVSFX**.

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```
                              Display Data Area
                                                              System:   DBS525B
 Data area . . . . . . . :   XSQLCVSFX
   Library . . . . . . . :     XAN4CDXA
 Type  . . . . . . . . . :   *CHAR
 Length  . . . . . . . . :   10
 Text  . . . . . . . . . :   XDDSTOSQL SQL Table Name Suffix

           Value
 Offset     *...+....1....+....2....+....3....+....4....+....5
     0     'XQ        '
```

The converted DDS source members can be flagged in columns 1 to 5. This flag is specified in the **XSQLCVFLG** data area. If the data area is blank or missing then columns 1 to 5 are not changed.

```
                              Display Data Area
                                                              System:   DBS525B
Data area . . . . . . . :   XSQLCVFLG
  Library . . . . . . . :     XAN4CDXA
Type  . . . . . . . . . :   *CHAR
Length  . . . . . . . . :   5
Text  . . . . . . . . . :   XDDSTOSQL Source Flag

          Value
Offset     *...+....1....+....2....+....3....+....4....+....5
    0     'XDSCV'
```

Certain run time values used in the generation of the DDL source are stored in data area – **XSQLCVPMS**.

Data Area XSQLCVPMS

```
                              Display Data Area
                                                              System:   DBS525B
Data area . . . . . . . :   XSQLCVPMS
  Library . . . . . . . :     XAN4CDXA
Type  . . . . . . . . . :   *CHAR
Length  . . . . . . . . :   100
Text  . . . . . . . . . :   XDDSTOSQL Run Parameters

          Value
Offset     *...+....1....+....2....+....3....+....4....+....5
    0     '*AS400*SQL*JOB*JOB   *ISO*JOB   *PERIOD*YES*PREFIX'
   50     'N*YES                                             '
```

The following values are currently stored. (The shipped value is shown first.)

- Positions 1 to 6: Standards Option – *AS400, *DB2, *ISO.
- Positions 7 to 10: Naming Option – *SQL, *SYS.
- Positions 11 to 14: Date Format – *JOB, *ISO, *EUR, *JIS, *USA, *MDY, *DMY, *YMD, *JUL.

- Positions 15 to 21: Date Separator – *JOB, *SLASH, *PERIOD, *COMMA, *DASH, *BLANK.
- Positions 11 to 14: Time Format – *ISO, *EUR, *JIS, *USA, *HMS.
- Positions 26 to 32: Time Separator – *JOB, *COLON, *PERIOD, *COMMA.
- Positions 33 to 39: Decimal Point – *PERIOD, *COMMA.
- Positions 40 to 43: Generate aliases – *YES, *NO. When generating aliases you can specify replacement characters **XSQLCVRPL**. The data area containing replacement characters are **XSQLCVRFR** and **XSQLCVRTO**.
- Positions 44 to 51: Leading numeric processing for aliases – *PREFIXN, *XLATE. If *PREFIXN is specified then "N" is added to the beginning of the alias name. *XLATE will translate the numeric into characters. (NOT YET IMPLEMENTED.)
- Positions 52 to 55: Compress embedded blanks for aliases – *YES, *NO. If *YES is specified then wherever there are two or more contiguous underscores in the generated alias they will be replaced by a single one.

Data Areas XSQLCVRFR and XSQLCVRTO

If you have requested the generation of aliases then you can specify replacement for invalid characters. You can specify up to 50 *from characters* in the **XSQLCVRFR** data area and up to 50 *to characters* in the **XSQLCVRTO** data area.

The characters are matched between *from* and *to* areas.

```
                              Display Data Area
                                                          System:   DBS525B
Data area . . . . . . . :   XSQLCVRFR
  Library . . . . . . . :     XAN4CDXA
Type  . . . . . . . . . :   *CHAR
Length  . . . . . . . . :   50
Text  . . . . . . . . . :   XDDSTOSQL Replacement Characters, From

           Value
Offset      *...+....1....+....2....+....3....+....4....+....5
    0      '@#$.                                              '
```

```
                              Display Data Area
                                                          System:   DBS525B
Data area . . . . . . . :   XSQLCVRTO
  Library . . . . . . . :     XAN4CDXA
Type  . . . . . . . . . :   *CHAR
Length  . . . . . . . . :   50
Text  . . . . . . . . . :   XDDSTOSQL Replacement Characters, To

           Value
Offset      *...+....1....+....2....+....3....+....4....+....5
    0      'QZX_                                              '
```

If any of the following characters remain then they are automatically removed: ,.;:!?%<>/\+-=*&£]{}

Embedded blanks are then replaced with underscores.

The only values that may normally need changing relate to the generation of aliases.

File Exclusions

Files are excluded in three ways:

- Source PF files which have been loaded into X-Analysis are automatically excluded. These can be found in **XPFSRC** file.
- Files with no members or multiple members are automatically excluded. A message is written to the error log for each of these files.
- Files can be manually excluded by adding them to **XMDLEXCS** file. (The Reason Code should be set to blank.)

Error Log

An Error Log is written to source member ERRORLOG in QTXTSRC in the X-Analysis library. The messages may be diagnostic or terminal.

Exception Processing

Please note the following:

- Multi-format files: Indexes are created for each file access path.
- LFs not using the PF format name or where individual fields specified: The format name is retained.
- No statement is required to point to the original PF format name.
- JOIN Files: JFILE and JOIN point to the SQL table names. The format name is retained. No statement is required to point to the original PF format name.
- FIFO/LIFO Files: The keyword cannot be used with SQL tables and is removed. A message is written to the error log for each file.
- REFERENCE Fields: These can only be used in PFs so the references are removed. A message is written to the error log for each file.
- TEXT specified on an LF format: Where the PF format can be added, TEXT cannot be specified so it is removed.

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- ALWNULL, CCSID() and DFT() field keywords: These are removed from the original PF definition when it is converted to an LF definition. (They will have been generated in the DDL source for the SQL table.)

Command Parameters

The **XDDSTOSQL** command requires the following parameters:

- **X-Analysis Library:** Enter the name of the X-Analysis cross-reference library built for the application containing the database objects to be converted.
- **New Database Library:** Enter the name of a new library which will contain the converted database.
- **Application Area:** Enter the name of the application area containing the database objects to be converted. You can also enter the special value of ***ALL**. This will result in all database objects in the application being converted.
- **Compilation Type:** This option will allow the user to choose whether this command should run all compilation commands or whether calls should be made to external change control systems. When the ***INLINE** option is selected, the user will be able to set various compile command parameters using data areas.

XWRKDTAARA command

The **XWRKDTAARA** command assists the user to maintain various values for data areas used in **XDDSTOSQL** command. The command is available in the library **XAOBJ**, which must be included in the library list, before executing the command. The command accepts the following two parameters:

XWRKDTAARA XRFLIB(XAN4CDXA) SYSTEM(XDDSTOSQL)

XRFLIB – Cross-Reference library

SYSTEM – The name of the command for which related data areas have to be listed.

```
X-Analysis                  Work with Data Areas              Databorough Ltd.
XARWKDARAS                                                           12:50:53
                                                                  2015-02-21
Enter options, press Enter.
5=Work with values


   Data Area

   XDDSTOSQL Source Flag
   XDDSTOSQL Run Parameters
   XDDSTOSQL Replacement Characters, From
   XDDSTOSQL Replacement Characters, To
   XDDSTOSQL SQL Table Name Suffix
```

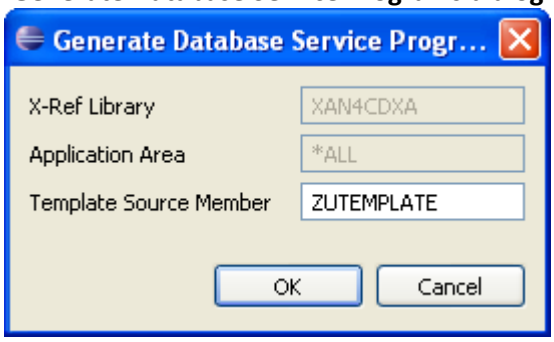
The above screen displays the command screen for **XWRKDTAARA**. Data areas related to the **XDDSTOSQL** command are listed here. The user can use **Option=5** against any of them to view/modify their value.

GENERATE DATABASE SERVICE PROGRAMS

The **Generate Database Service Programs** option calls the IBM i command, **XWRTDBSP** and submits the job in batch. This option is available on cross-reference library, application areas and physical files (PF).

Opt for the context menu on the tutorial application and select the **Generate Database Service Programs** option from the **Export Options** submenu. The following dialog invokes when the user selects the option:

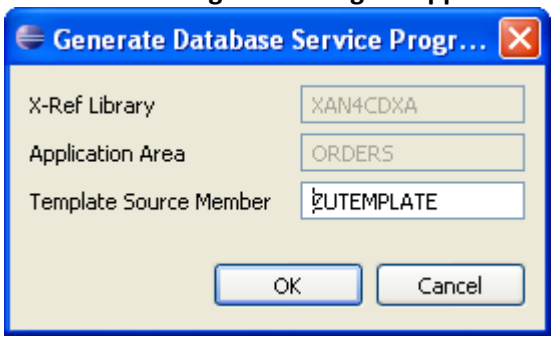
Generate Database Service Programs dialog



Click **OK** to execute the batch command.

Opt for the context menu on the application area **ORDERS**, and select the **Generate Database Service Programs** option from the **Export Options** submenu. The following dialog invokes when the user selects this option:

Generate Database Service Programs dialog for application area, ORDERS



The **XWRTDBSP** command will generate Service programs for the specified database files. The generated source will be placed in **QRPGLESRC** of the specified cross-reference library. The type of service program generated will depend on the template specified.

The command requires Template Source Member name as input parameters.

The pre-defined templates are located in **XAOBJ/QRPGLESRC**. The following are the available pre-defined templates:

- **ZUTEMPLATE** – file update/delete program template
- **ZSTEMPLATE** – this will generate an SQL CRUD service program.
- **ZXTEMPLATE** – this will generate an SQL extended READ service program.
- **ZRTEMPLATE** – this will generate an RPGLE CRUD service program.

Generated Service Program

The service program naming depends upon the template selected. The following table explains this:

Template	Service Program starting with
ZUTEMPLATE	ZU
ZSTEMPLATE	ZS
ZRTEMPLATE	ZR
ZXTEMPLATE	ZX

On selecting **ZSTEMPLATE**, an SQL CRUD service program is generated; whereas on selecting **ZRTEMPLATE**, an RPGLE CRUD service program is generated. In both the cases, a service program is generated containing sub-procedure definitions for READ / UPDATE / WRITE / DELETE record.

On selecting **ZXTEMPLATE**, an SQL extended READ service program is generated. The generated service program contains sub-procedure definitions for Extended READ.

Using Generated Service Program

The following is a snapshot of the generated service program:

Snapshot of a Database Service Program

```
H*¹------------------------------------------------------------------
H debug(*yes) copyright('Databorough Ltd. 2008')
H nomain

D*****************************************************************
D*¹D e f i n i t i o n s
D*****************************************************************
D zrecord       e ds                  extname(condet)
D zrecordsql    e ds                  extname(condet)
D                                     prefix(sql)
D zrecordcpy    e ds                  extname(condet)
D                                     prefix(cpy)

D*¹Data structure containing all required parameters
D*¹ Plus: before and after database record image.
D*¹ Keys passed in ZOLDRECORD, data returned in ZNEWRECORD
```

```
     D zsdata          ds
     D znewrecord                          like(zrecord)
     D zoldrecord                          like(zrecordcpy)
     D/copy qrpglesrc,zsheader

     D*¹Prototypes

     D*¹Read
     D zcondetr        pr                  likeds(zsdata)
     D zreadparms                          likeds(zsdata)

     D*¹Update
     D zcondetu        pr                  likeds(zsdata)
     D zupdateparms                        likeds(zsdata)

     D*¹Write
     D zcondetw        pr                  likeds(zsdata)
     D zwriteparms                         likeds(zsdata)

     D*¹Delete
     D zcondetd        pr                  likeds(zsdata)
     D zdeleteparms                        likeds(zsdata)
```

Note the various sub-procedures defined (for Read, Update, Write, and Delete) in the service program are displayed above.

The user should call the appropriate sub-procedure to READ / UPDATE / WRITE / DELETE the record. There is one parameter – a data structure which includes a 'before' and 'after' image of the database record, plus the fields in the copybook member **ZSHEADER**. Keys are passed in the 'before' image (ZOLDRECORD) and data is returned in the 'after' image (ZNEWRECORD).

Currently, only one field is used from ZSHEADER – **ACTION**.

The copy-book member ZSHEADER

```
     D*¹----------------------------------------------------------------
     D*ÌAuthor:  DATABOROUGH LTD 2008
     D*¹----------------------------------------------------------------
     D*¹SERVICE PROGRAM PARAMETERS
     D*¹----------------------------------------------------------------
     D inuser                        10
     D indate                         8
     D intime                         6
     D action                        10
     D entrypoint                    20
     D rtnmsgtp                       1
     D rtnmsg                        80    dim(20)
     D rtnmsgids                      7    dim(20)
     D rtnflds                       30    dim(20)
     D rtnupdbuf                      1
     D rtnnewfun                     23
     D gtots                         30p 9
     D zworkflds                     50a   dim(20)
     D zwfnames                      30a   dim(20)
     D zwftypes                       1a   dim(20)
     D supflds                       30    dim(20)
     D confldS                       30    dim(20)
     D clrflds                       30    dim(20)
```

```
     D ovrclrs                        3    dim(20)
     D selact                        20
     D supacts                       23    dim(50)
     D calltype                       1
     D*¹----------------------------------------------------------------------
```

Document Manager

The Documenter (Document Manager) facilitates the generation of a PDF/MS Word document containing the system design information for the specified objects in an application.

The System Documentation is generated in the following two ways:

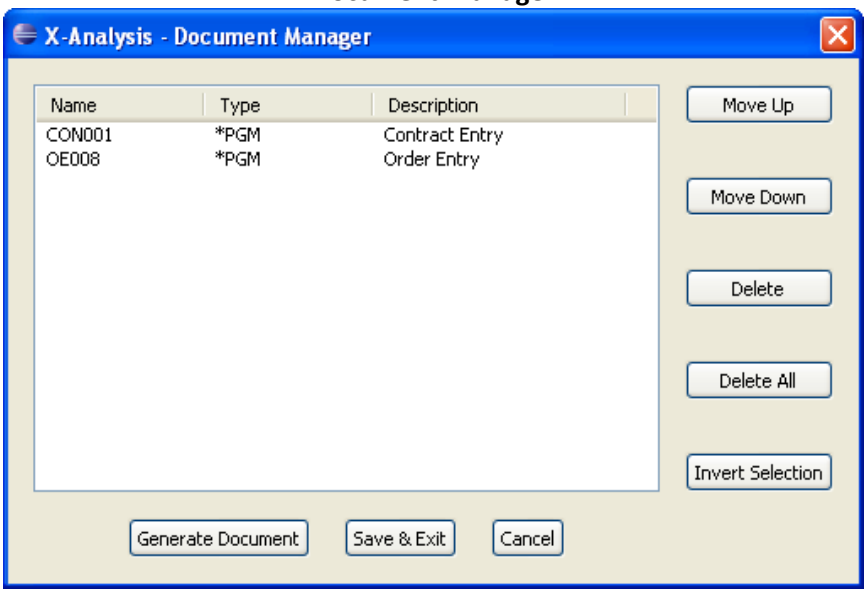
- Marking the individual objects/complete list
- Documenting an application area

MARKING THE INDIVIDUAL OBJECTS/COMPLETE LIST

Follow the steps below to generate the system document:

1. Start X-Analysis.
2. Select a cross-reference from the cross-reference list view.
3. Mark objects to be included for the System Documentation process. To mark the objects for documentation process, use the context menu on objects and select the **Mark for Documenter** option. Alternatively, the entire list can be selected for documentation by selecting the **Mark all for Documenter** option, available under the X-Analysis menu.
4. Select the **Documenter** button from the main toolbar.

Document Manager



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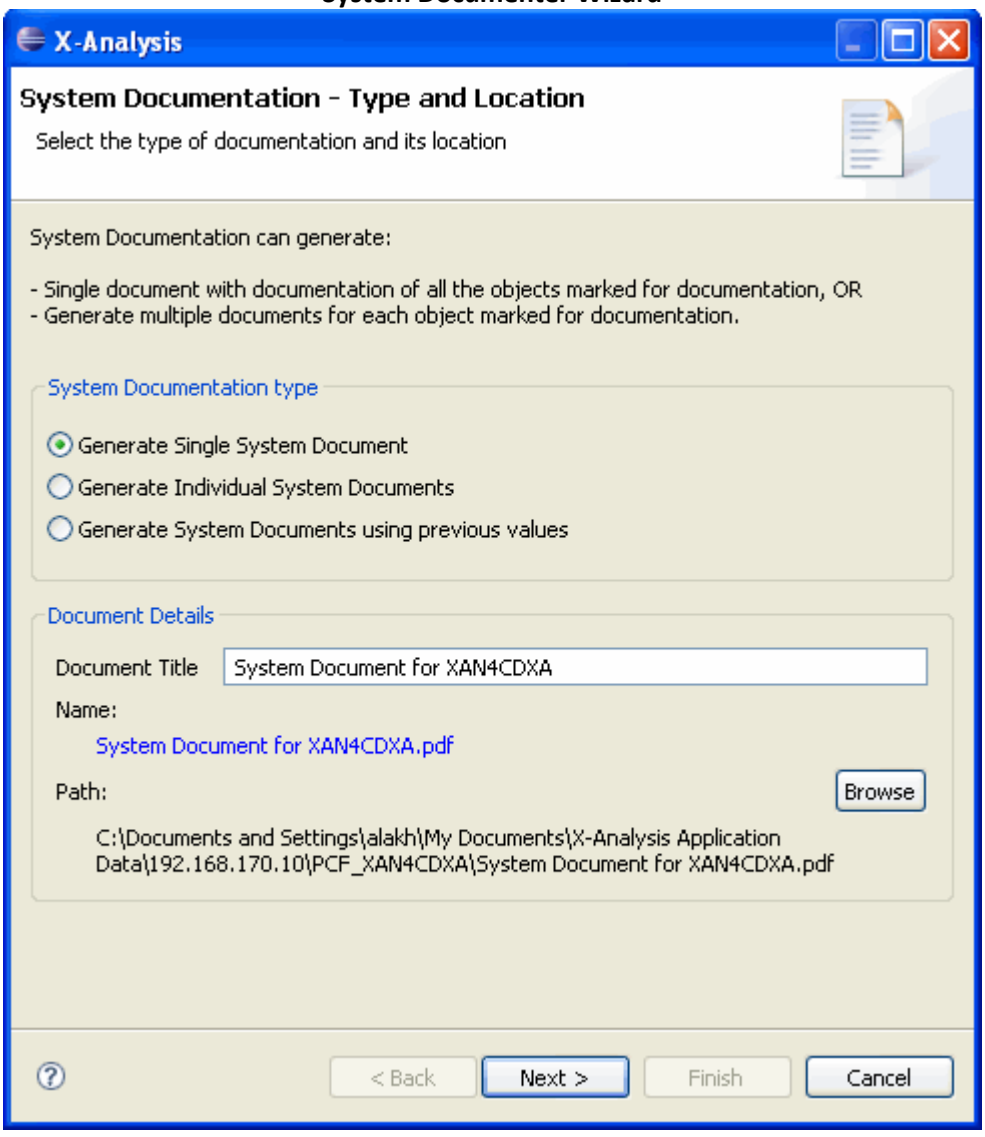
The Objects/Members on the documenter list can be arranged using the **Move Up** / **Move Down** / **Delete** / **Delete All** buttons on the Document Manager.

The Document Manager provides a facility for object selection for system document – **Invert Selection**. On clicking **Invert Selection**, the selected object gets un-selected and all other un-selected objects get selected.

After ordering of the objects, click **Generate Document**. This invokes the Documenter Wizard, as shown below:

System Documenter Wizard


X-Analysis
System Documentation - Type and Location
Select the type of documentation and its location
System Documentation can generate:
- Single document with documentation of all the objects marked for documentation, OR
- Generate multiple documents for each object marked for documentation.
System Documentation type
Generate Single System Document
Generate Individual System Documents
Generate System Documents using previous values
Document Details
Document Title
System Document for XAN4CDXA
Name:
System Document for XAN4CDXA.pdf
Path:
Browse
C:\Documents and Settings\alakh\My Documents\X-Analysis Application Data\192.168.170.10\PCF_XAN4CDXA\System Document for XAN4CDXA.pdf
< Back
Next >
Finish
Cancel

Note that the **Documenter** option can also be alternatively accessed from the **Export Options** drop-down on the Source Browser toolbar of a selected object.

Document Wizard Sections

System Documentation Type

Various options are available for the System Documentation type. By default, the **Generate Single System Document** option is checked.

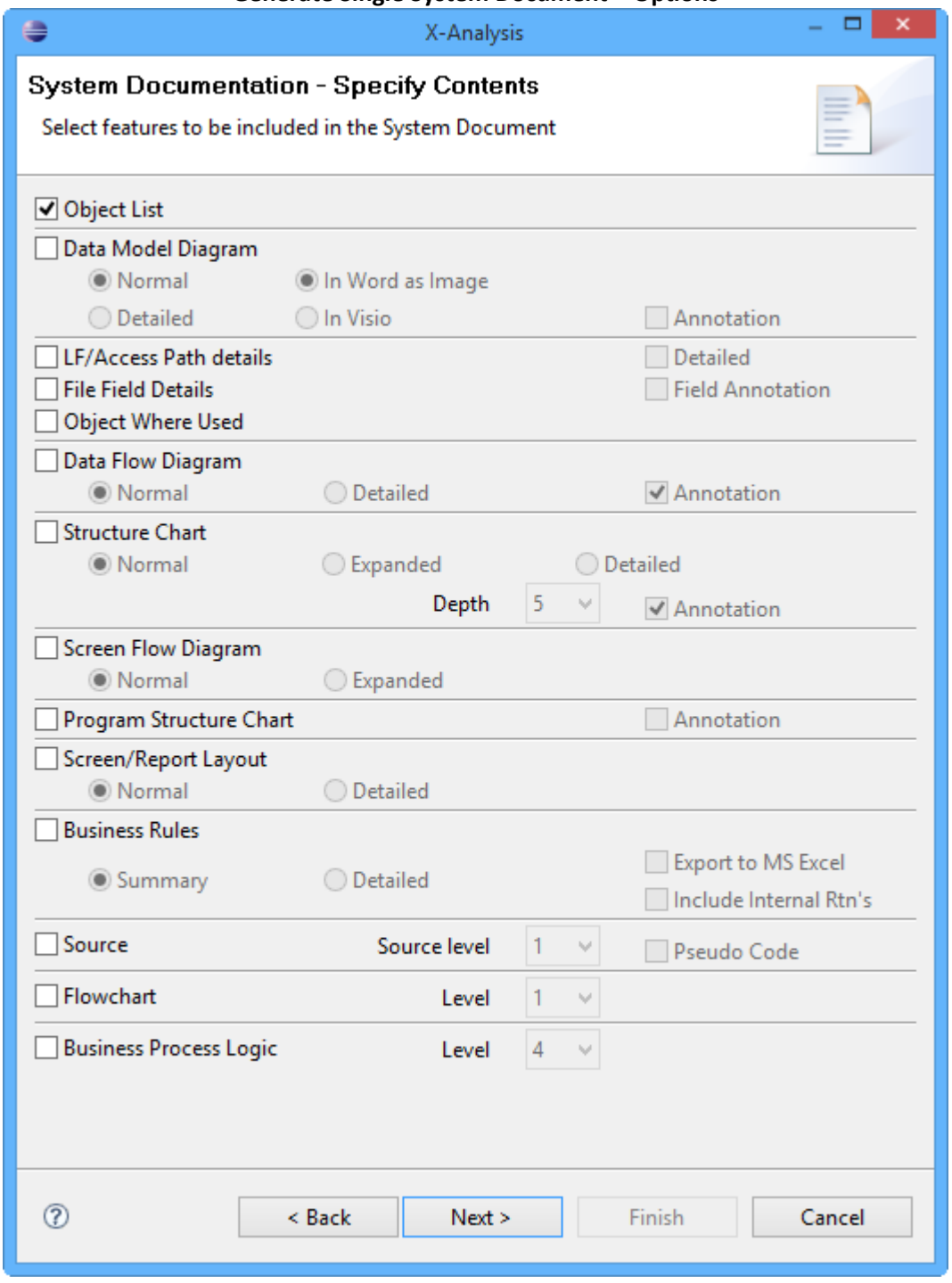
Document Details

Document Title – The user can change document title as per the requirement.

Path – Click the **Browse** button to change the default path. The default path is <C:\Documents and Settings\alakh\My Documents\X-Analysis Application Data\192.168.170.10\PCF_XAN4CDXA>

Press **Next** to proceed further. For Single System Documentation, the following dialog is displayed:

Generate Single System Document – Options



A user can select different options from the above dialog as per the requirements. If a user selects the **Business Rules** for documentation, then he has the option to get the business rules documented in MS Excel. This can be done by checking the **Export to MS Excel** option. If the user selects the Business Rules for documentation with the **Summary**

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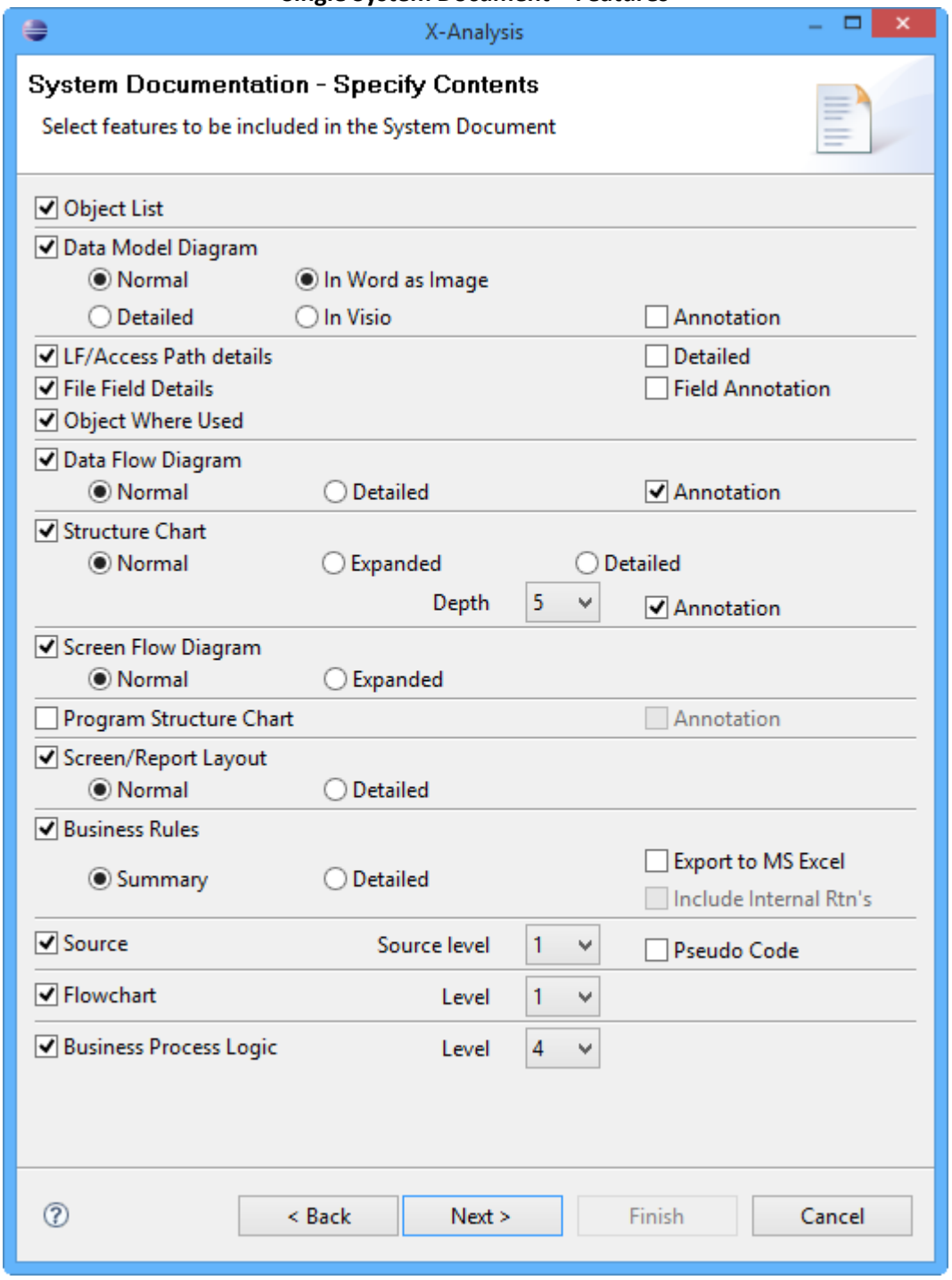
option, then the basic rule information will be documented; if the user selects the **Detailed** option, then the logic behind the rule will also be documented.

Single System Document – Features

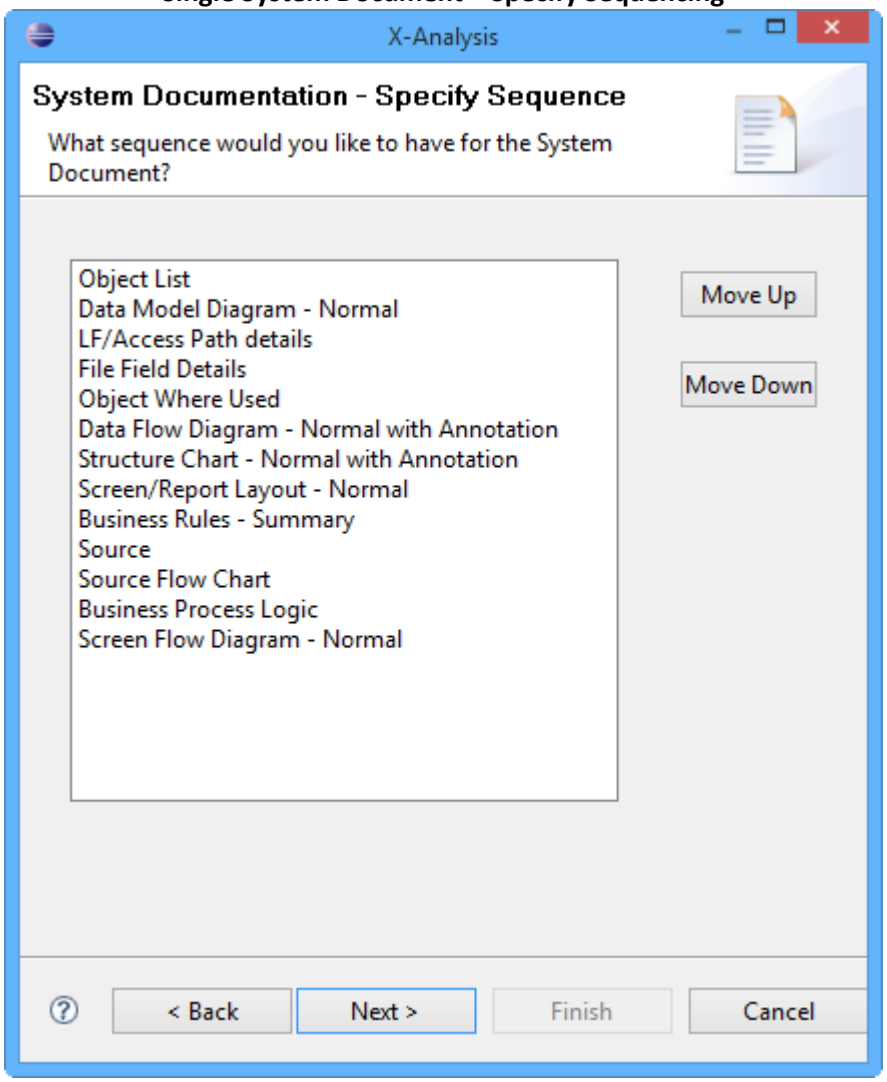


If a user selects the **Screen/Report Layout** for documentation with the **Normal** option, then the System Documentation process will print the Screen and the Fields list of

individual formats one after the other, for all the screen formats. If the **Detailed** option is selected, then it will also print the Header information, the Data Content Diagram and the Screen Action Diagram for each screen, apart from the Screens and the Fields List for all the screen formats.

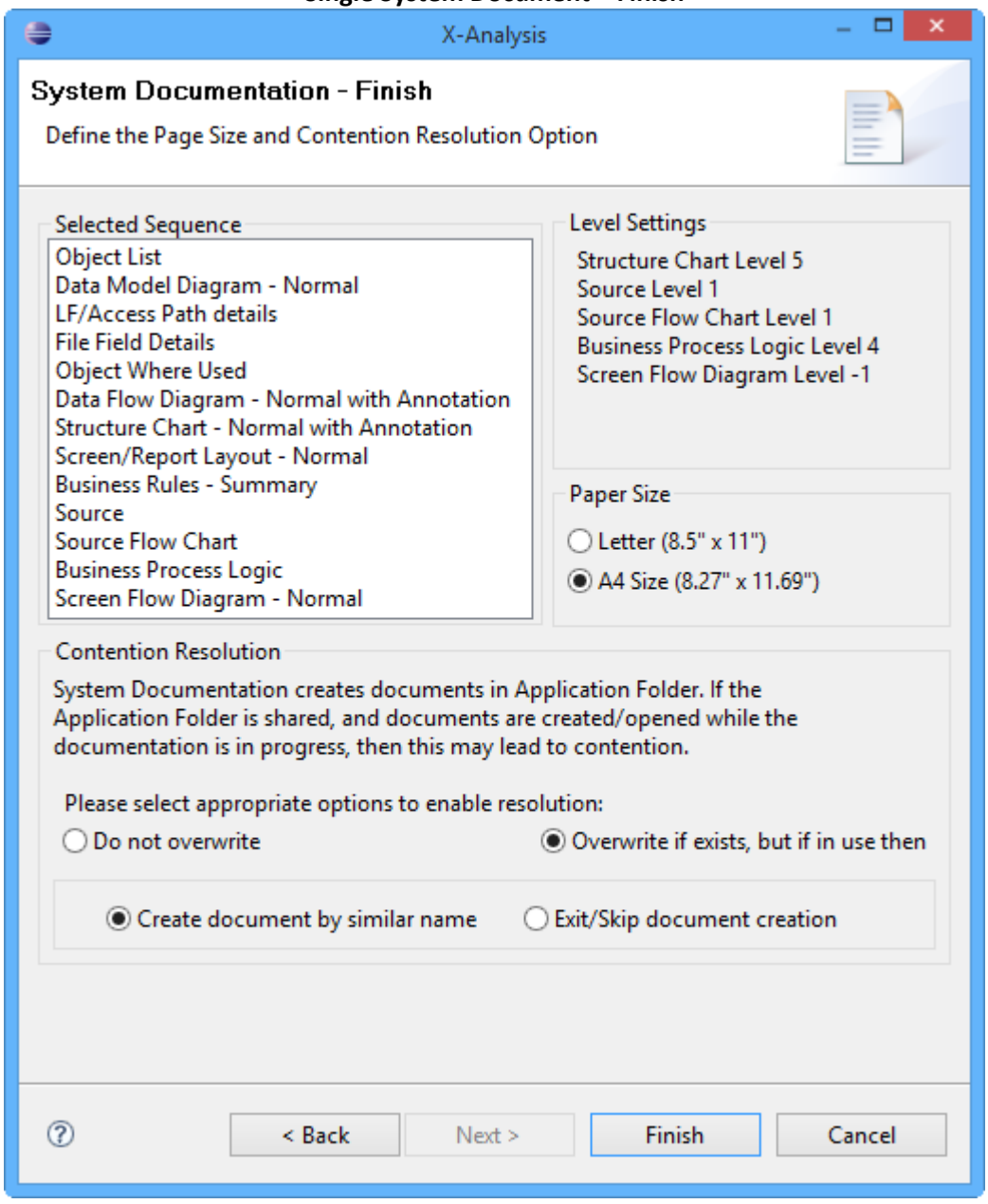
Select the options to be included in the document and click **Next** to proceed further.

Single System Document – Specify Sequencing



From the above screen, the user can re-sequence the options selected for the System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all the selections that he has made and can also define various options related to document formatting, like 'Paper Size', 'Contention Resolution', etc.

Single System Document – Finish

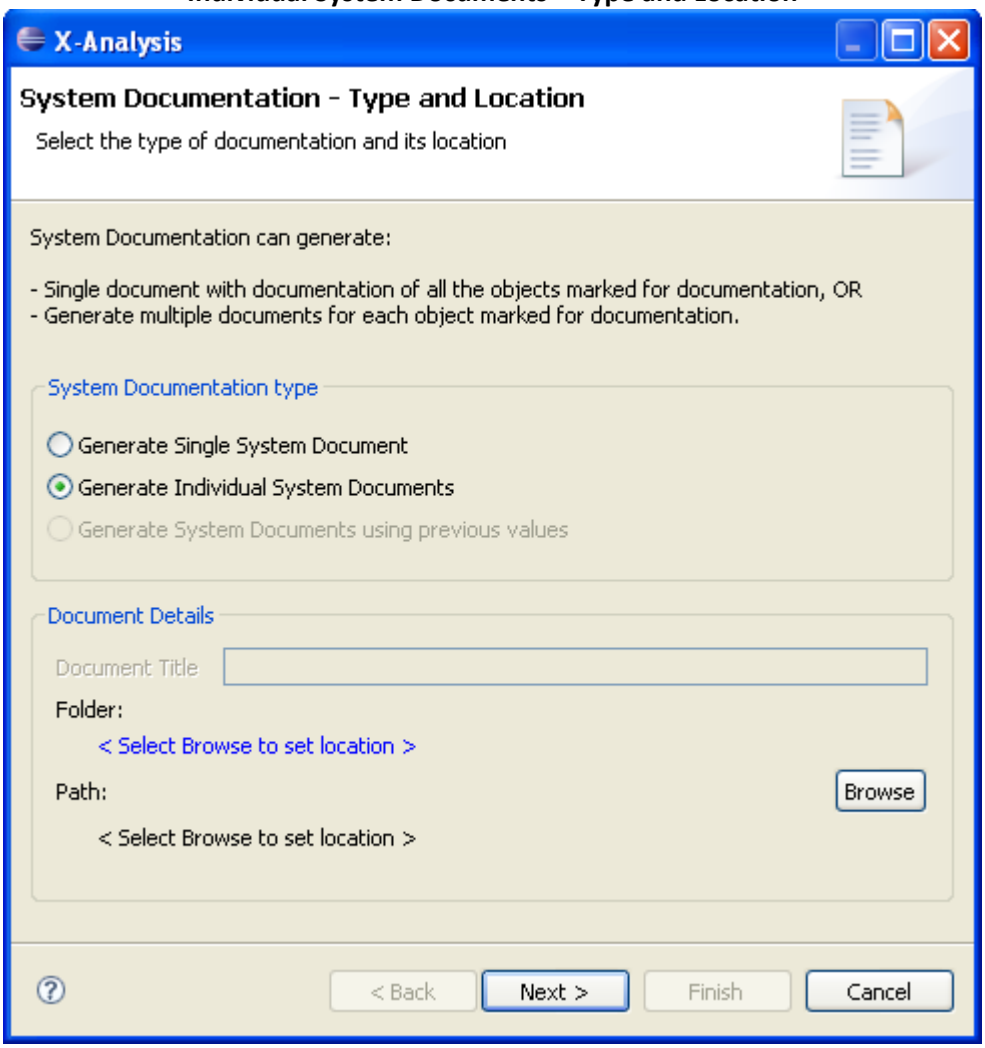

X-Analysis
System Documentation - Finish
Define the Page Size and Contention Resolution Option
Selected Sequence
Object List
Data Model Diagram - Normal
LF/Access Path details
File Field Details
Object Where Used
Data Flow Diagram - Normal with Annotation
Structure Chart - Normal with Annotation
Screen/Report Layout - Normal
Business Rules - Summary
Source
Source Flow Chart
Business Process Logic
Screen Flow Diagram - Normal
Level Settings
Structure Chart Level 5
Source Level 1
Source Flow Chart Level 1
Business Process Logic Level 4
Screen Flow Diagram Level -1
Paper Size
Letter (8.5" x 11")
A4 Size (8.27" x 11.69")
Contention Resolution
System Documentation creates documents in Application Folder. If the Application Folder is shared, and documents are created/opened while the documentation is in progress, then this may lead to contention.
Please select appropriate options to enable resolution:
Do not overwrite
Overwrite if exists, but if in use then
Create document by similar name
Exit/Skip document creation
< Back
Next >
Finish
Cancel

Click **Finish** to generate the document. The progress status is displayed on the screen while generating the System document. The document will be located in the specified save location.

Generate Individual System Documents

Select the **Generate Individual System Documents** option from the following dialog:

Individual System Documents – Type and Location



After selecting the **Generate Individual System Documents** option, click **Browse**. Select the desired location to save the document.

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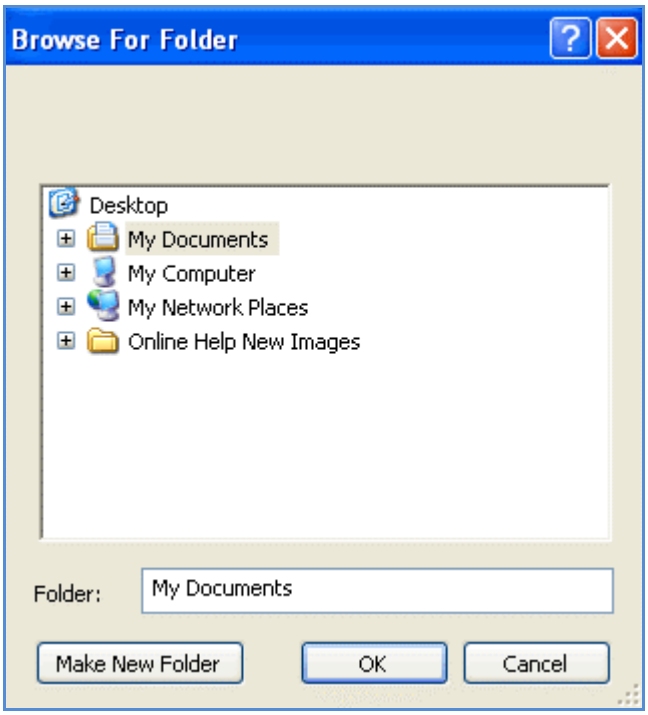
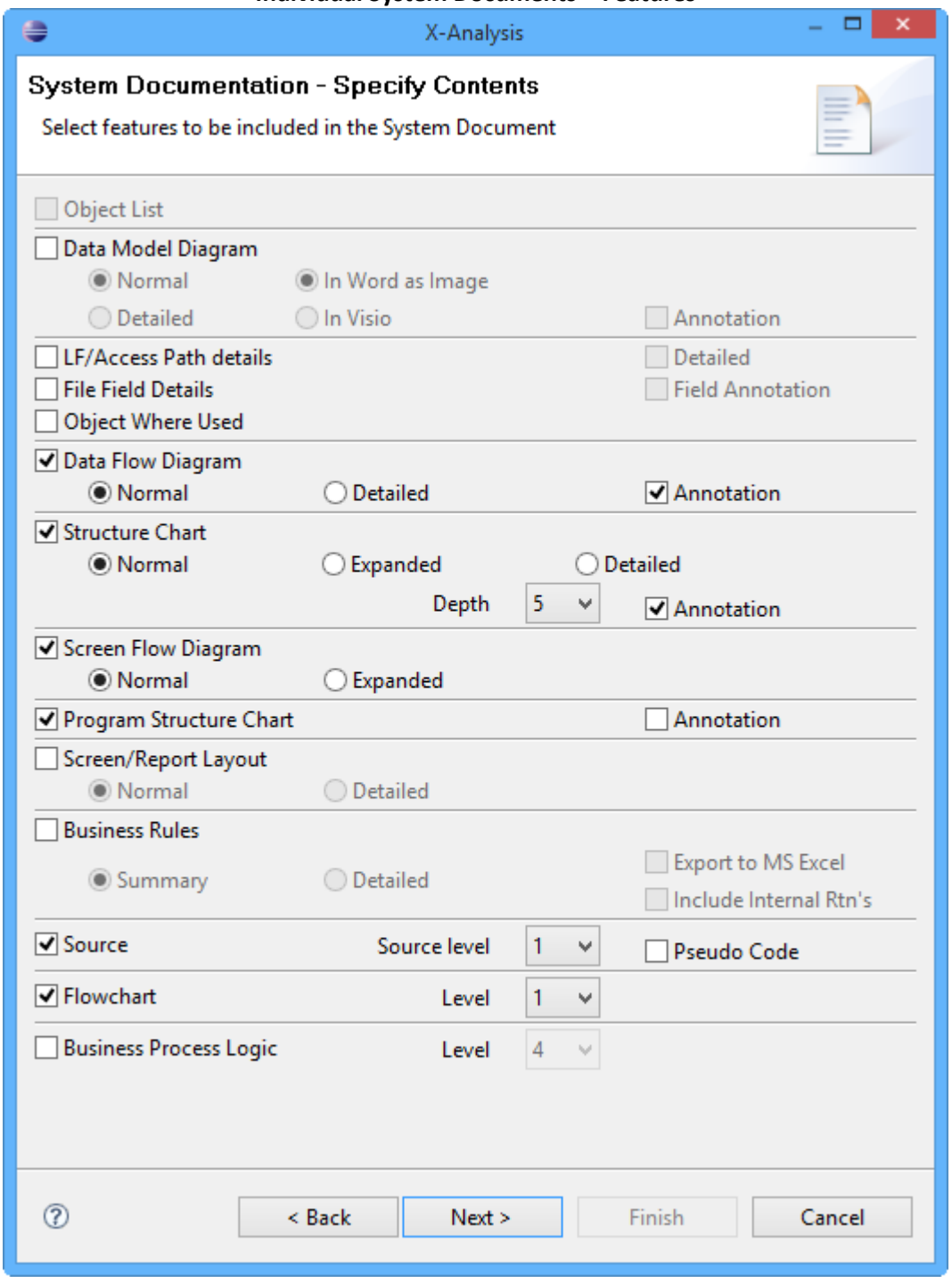
Document Folder



For the **Generate Individual System Documents** option, the following dialog is displayed after the user clicks **Next** on the System Document Wizard:

Individual System Documents – Features



The **Object List** option is disabled in this dialog. Choose the options which you want to document from the above dialog.

If a user selects the **Business Rules** for documentation, then he has the option to get the business rules documented in MS Excel. This can be done by checking the **Export to MS Excel** option. If the user selects the Business Rules for documentation with the **Summary**

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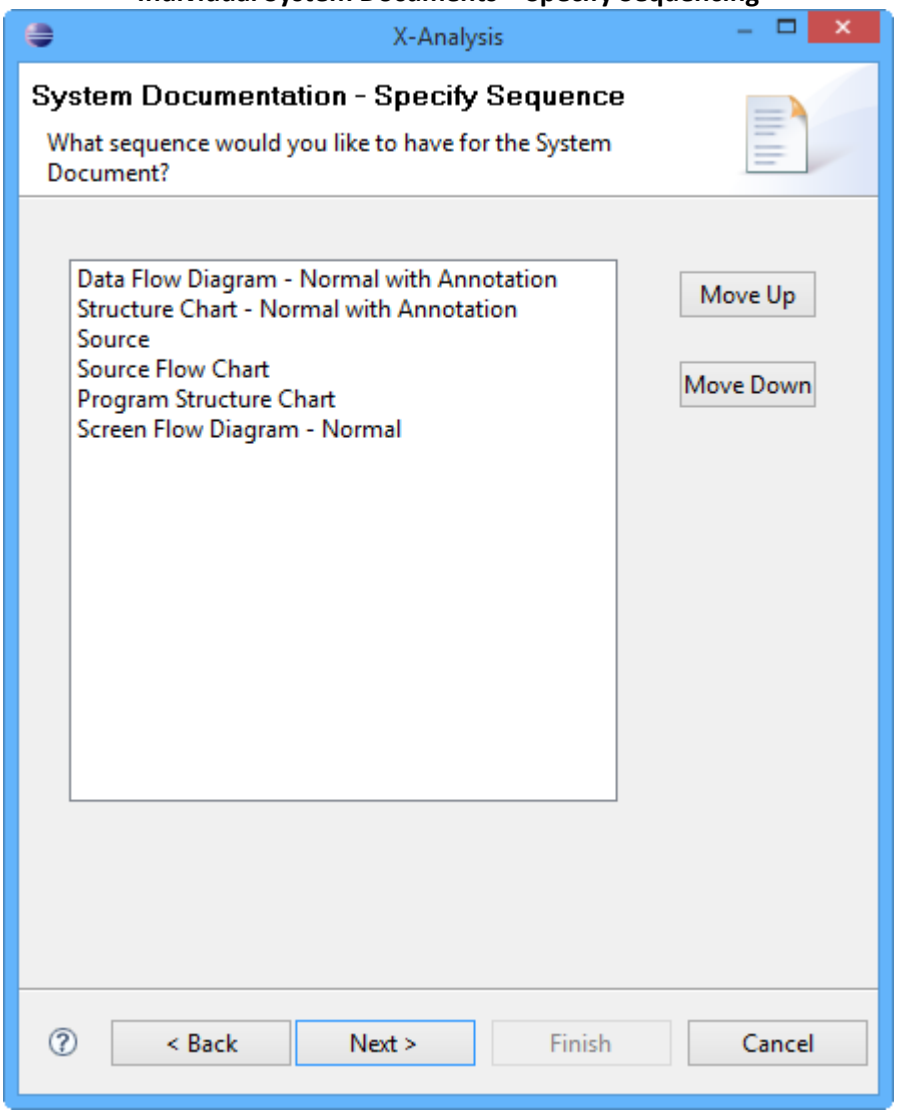
option, then the basic rule information will be documented; if he selects the **Detailed** option, then the logic behind the rule will also be documented.

If a user selects the **Screen/Report Layout** for documentation with the **Normal** option, then the System Documentation process will print the Screen and the Fields list of individual formats one after the other, for all the screen formats. If the **Detailed** option is selected, then it will also print the Header information, the Data Content Diagram and the Screen Action Diagram for each screen, apart from the Screens and the Fields List for all the screen formats.

Click **Next** which displays the following screen:

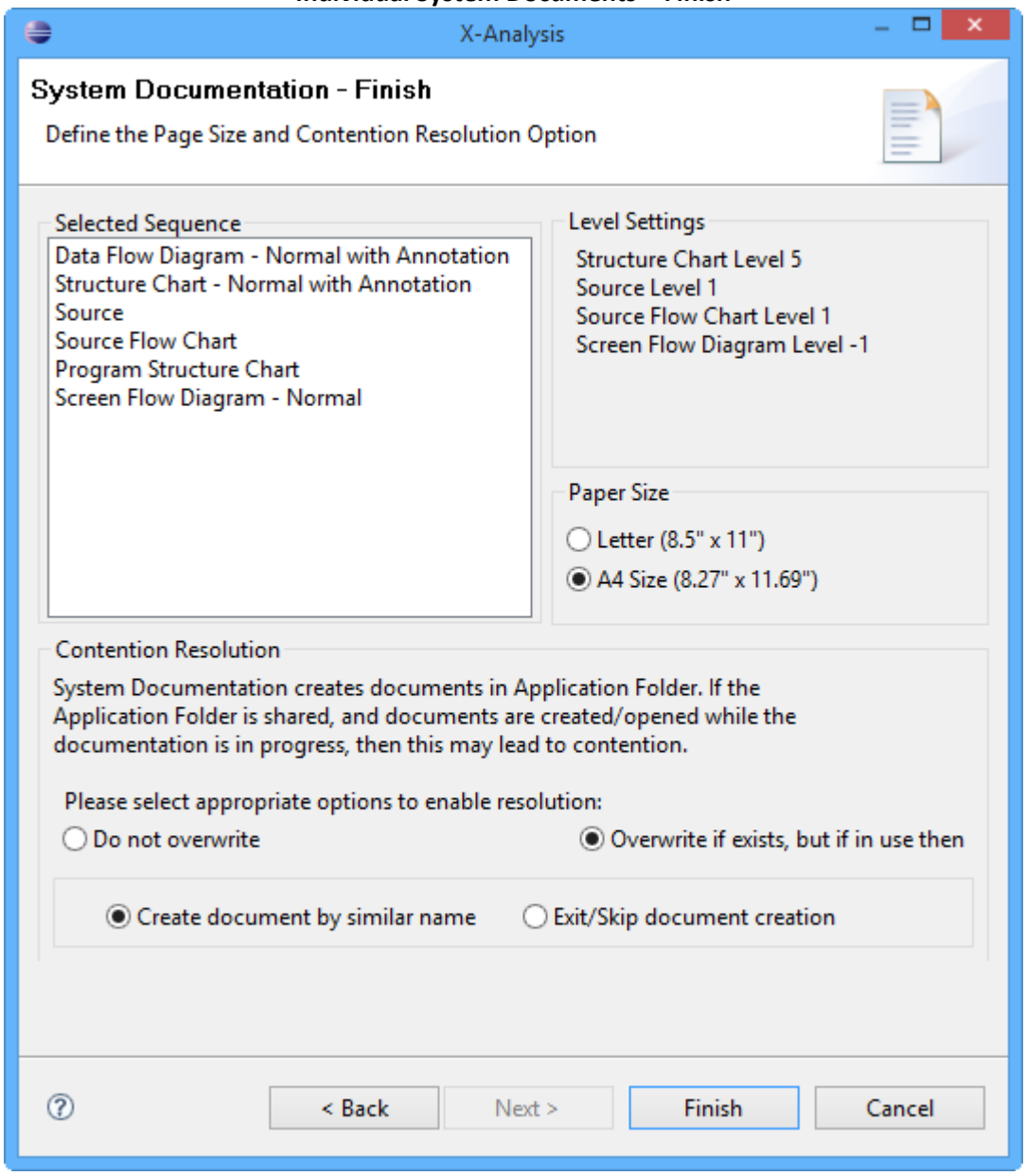
Individual System Documents – Specify Sequencing



From the above screen, the user can re-sequence the options selected for System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all the selections that he has made and can also define

various options related to document formatting, like 'Paper Size', 'Contention Resolution', etc.

Individual System Documents – Finish


X-Analysis
System Documentation - Finish
Define the Page Size and Contention Resolution Option
Selected Sequence
Data Flow Diagram - Normal with Annotation
Structure Chart - Normal with Annotation
Source
Source Flow Chart
Program Structure Chart
Screen Flow Diagram - Normal
Level Settings
Structure Chart Level 5
Source Level 1
Source Flow Chart Level 1
Screen Flow Diagram Level -1
Paper Size
Letter (8.5" x 11")
A4 Size (8.27" x 11.69")
Contention Resolution
System Documentation creates documents in Application Folder. If the Application Folder is shared, and documents are created/opened while the documentation is in progress, then this may lead to contention.
Please select appropriate options to enable resolution:
Do not overwrite
Overwrite if exists, but if in use then
Create document by similar name
Exit/Skip document creation
< Back
Next >
Finish
Cancel

Click **Finish** to generate the document. The progress status is displayed on screen while generating the system document. The generated document will be available in the specified saved location.

System Documents using previous values

X-Analysis provides a unique feature of recalling previous options opted by the user in the System Documentation process. With the help of this feature the user can generate a

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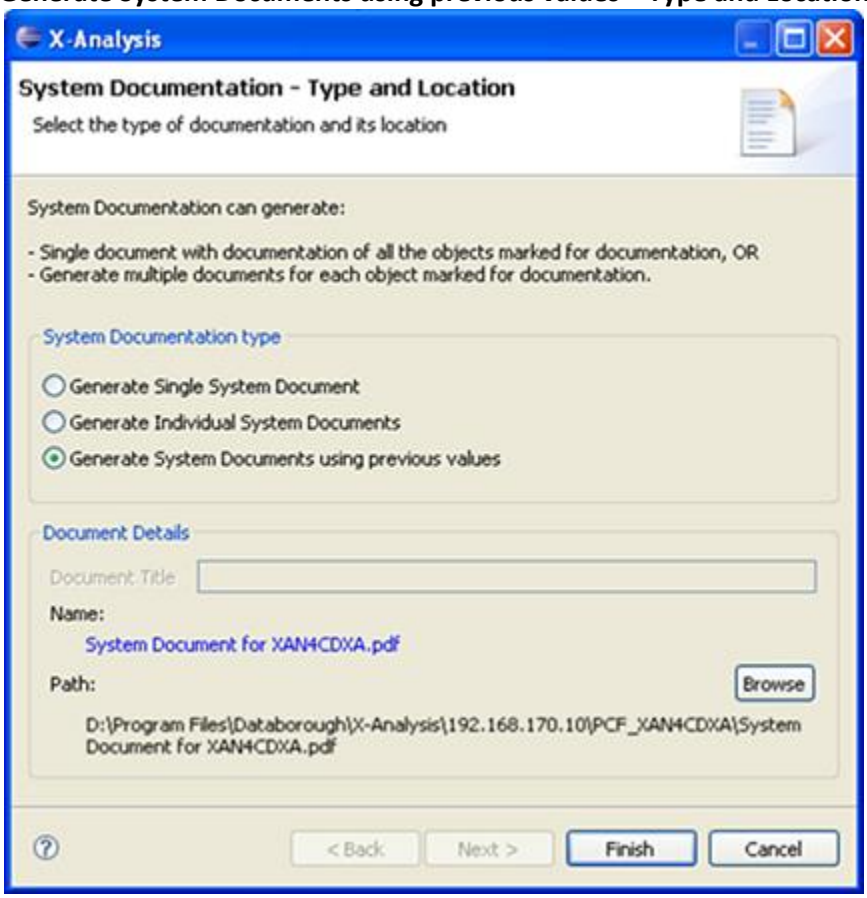
System Document without selecting the same options again for the System Documentation process.

The **Generate System Documents using previous values** option can be used by the user when he wants to generate the System Document using the previous options selected for the System Documentation.

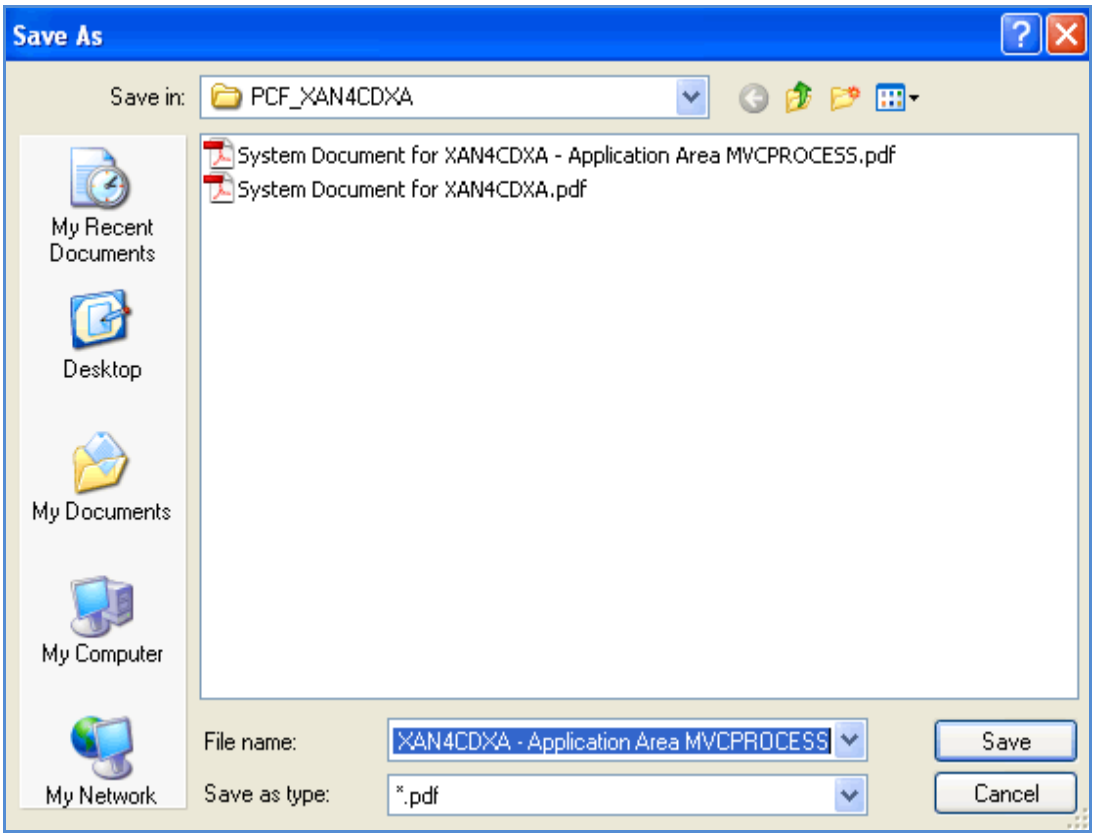
This option gets disabled if the user switched to generate the System Document for Application Area from System Documentation for Object(s) or vice-versa. Start the Documenter (either by marking individual Objects for Documentation or selecting the **Documenter** option on Application Area). Select the **Generate System Documents using previous values** option from the documentation wizard as shown below:

Generate System Documents using previous values – Type and Location


X-Analysis
System Documentation - Type and Location
Select the type of documentation and its location
System Documentation can generate:
- Single document with documentation of all the objects marked for documentation, OR
- Generate multiple documents for each object marked for documentation.
System Documentation type
Generate Single System Document
Generate Individual System Documents
Generate System Documents using previous values
Document Details
Document Title
Name:
System Document for XAN4CDXA.pdf
Path:
Browse
D:\Program Files\Databorough\X-Analysis\192.168.170.10\PCF_XAN4CDXA\System Document for XAN4CDXA.pdf
< Back
Next >
Finish
Cancel

After selecting the **Generate System Documents using previous values** option, click **Browse** to invoke the **Save As** dialog. Select the desired location to save the document and enter a new file name, if required.

Document Folder



Then, click **Finish** to initiate the System Documentation Process.

DOCUMENTING AN APPLICATION AREA

The **Document Application Area** option documents all information about objects belonging to the selected application area. This option is available on the context menu of an application area and invokes the System Documentation Wizard.

On selecting the **Document Application Area** option, the following System Documentation Wizard appears:

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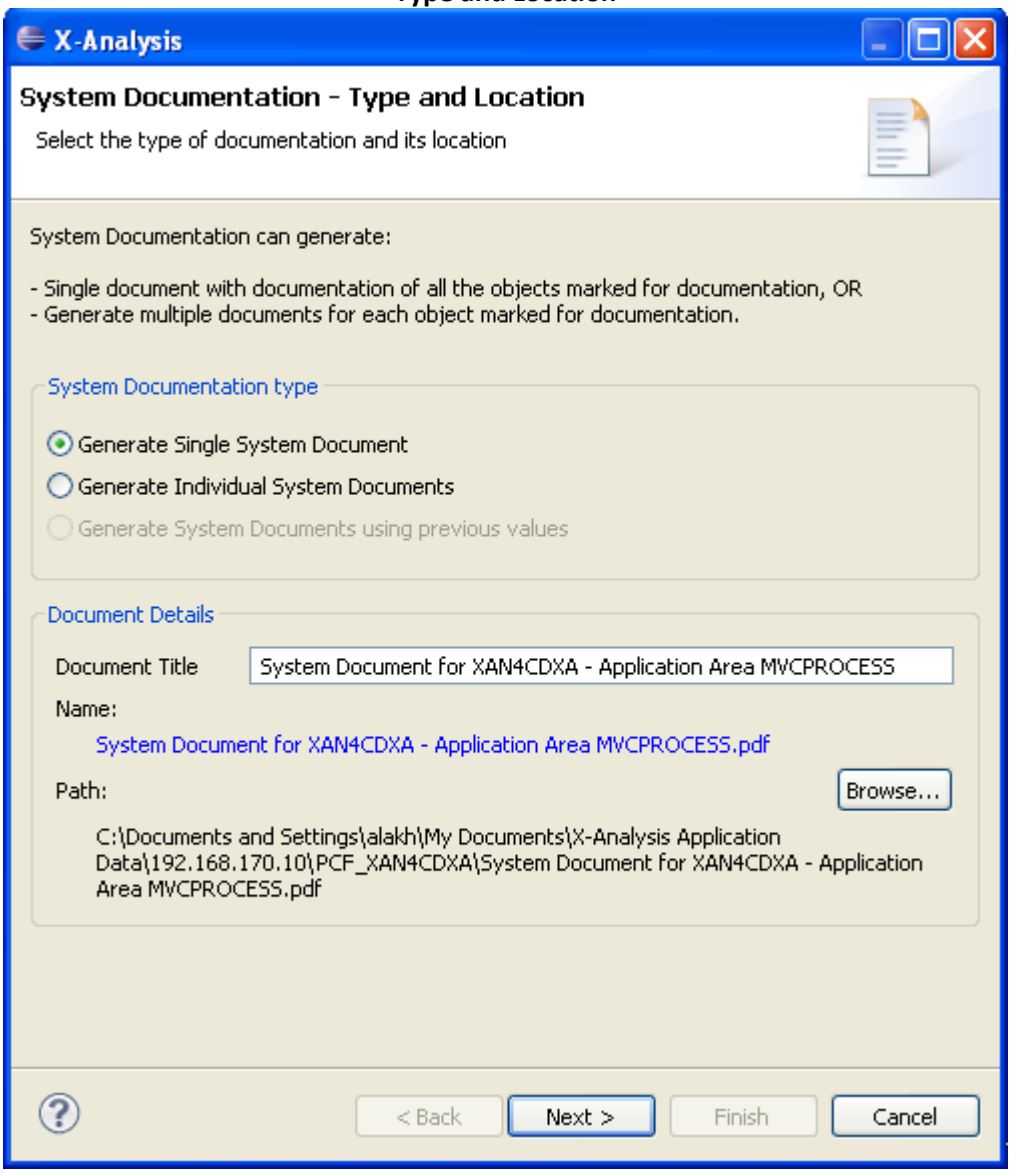
Type and Location


X-Analysis
System Documentation - Type and Location
Select the type of documentation and its location
System Documentation can generate:
- Single document with documentation of all the objects marked for documentation, OR
- Generate multiple documents for each object marked for documentation.
System Documentation type
Generate Single System Document
Generate Individual System Documents
Generate System Documents using previous values
Document Details
Document Title
System Document for XAN4CDXA - Application Area MVCPROCESS
Name:
System Document for XAN4CDXA - Application Area MVCPROCESS.pdf
Path:
Browse...
C:\Documents and Settings\alakh\My Documents\X-Analysis Application Data\192.168.170.10\PCF_XAN4CDXA\System Document for XAN4CDXA - Application Area MVCPROCESS.pdf
< Back
Next >
Finish
Cancel

You can choose from the following options:

1. Generate a single document with documentation for all objects marked for documentation in the Application Area.

2. Generate individual documents for all object marked for documentation in the Application Area.

3. Generate System Document using previous values for the Application Area.

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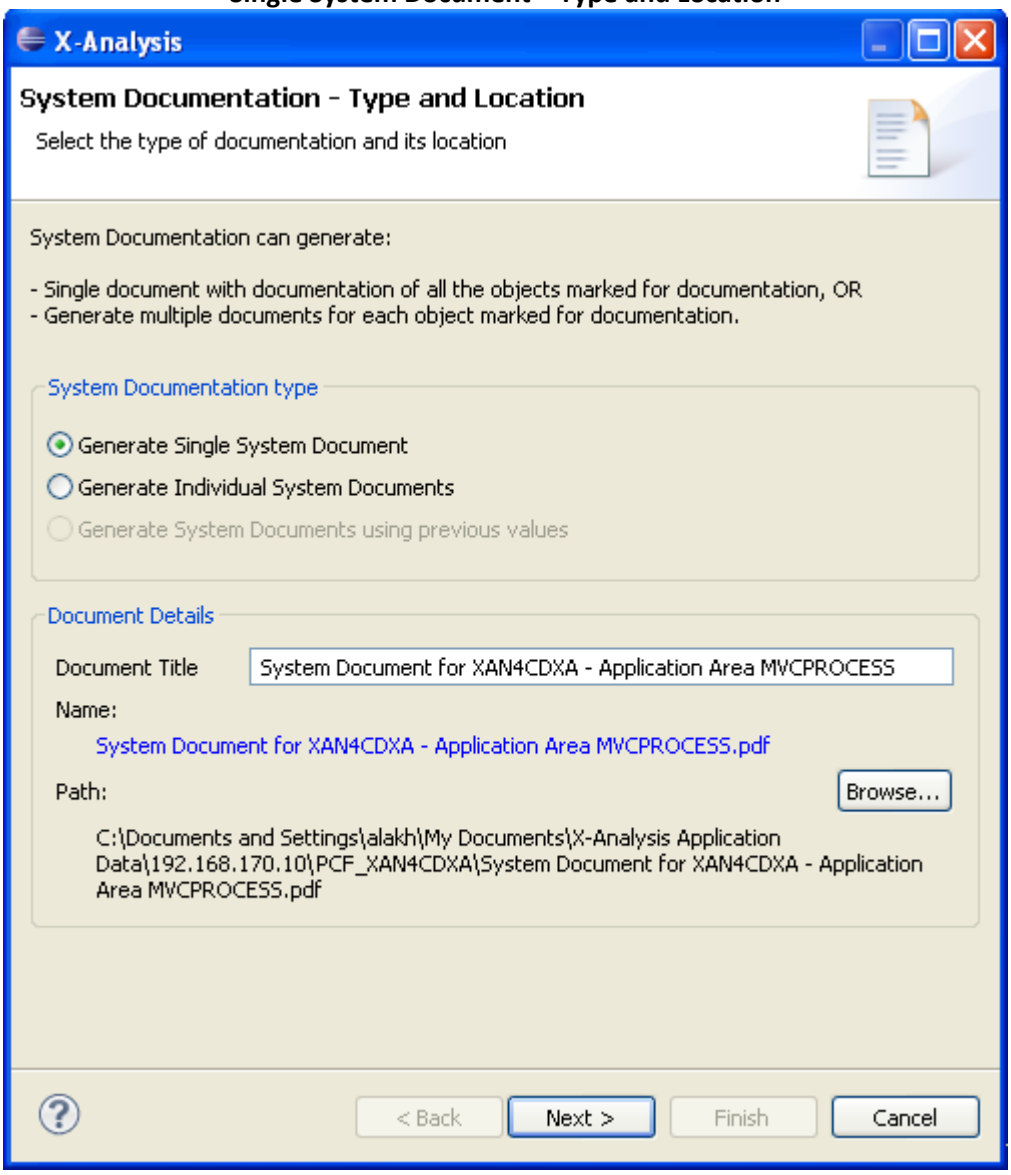
Document Application Area-Single System Document

Select the **Generate Single System Document** option, as displayed below:

Single System Document – Type and Location


X-Analysis
System Documentation - Type and Location
Select the type of documentation and its location
System Documentation can generate:
- Single document with documentation of all the objects marked for documentation, OR
- Generate multiple documents for each object marked for documentation.
System Documentation type
Generate Single System Document
Generate Individual System Documents
Generate System Documents using previous values
Document Details
Document Title
System Document for XAN4CDXA - Application Area MVCPROCESS
Name:
System Document for XAN4CDXA - Application Area MVCPROCESS.pdf
Path:
Browse...
C:\Documents and Settings\alakh\My Documents\X-Analysis Application Data\192.168.170.10\PCF_XAN4CDXA\System Document for XAN4CDXA - Application Area MVCPROCESS.pdf
< Back
Next >
Finish
Cancel

To change the default document name and path, click **Browse** to specify new document name and path. The default location is <Application Folder>.

After this step, click **Next** to proceed further as shown below:

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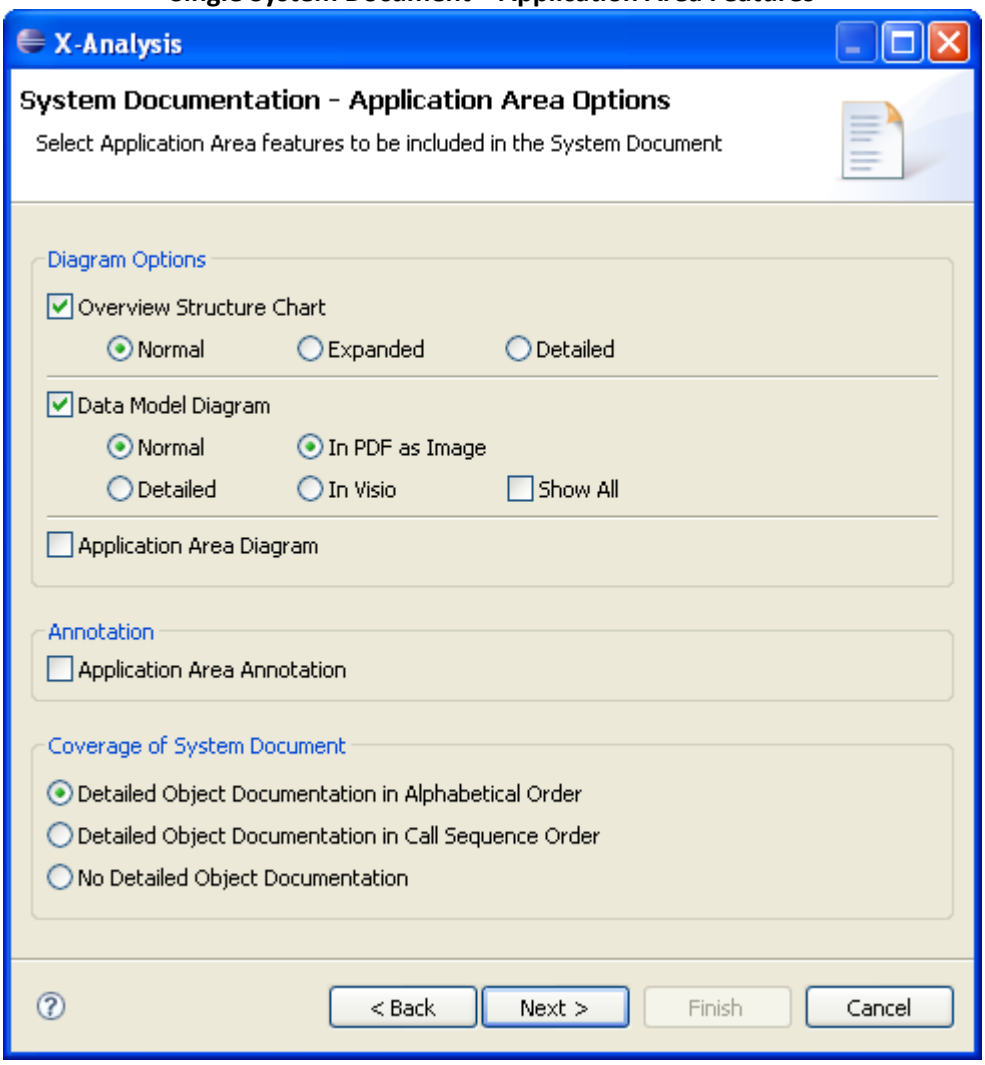
Single System Document – Application Area Features



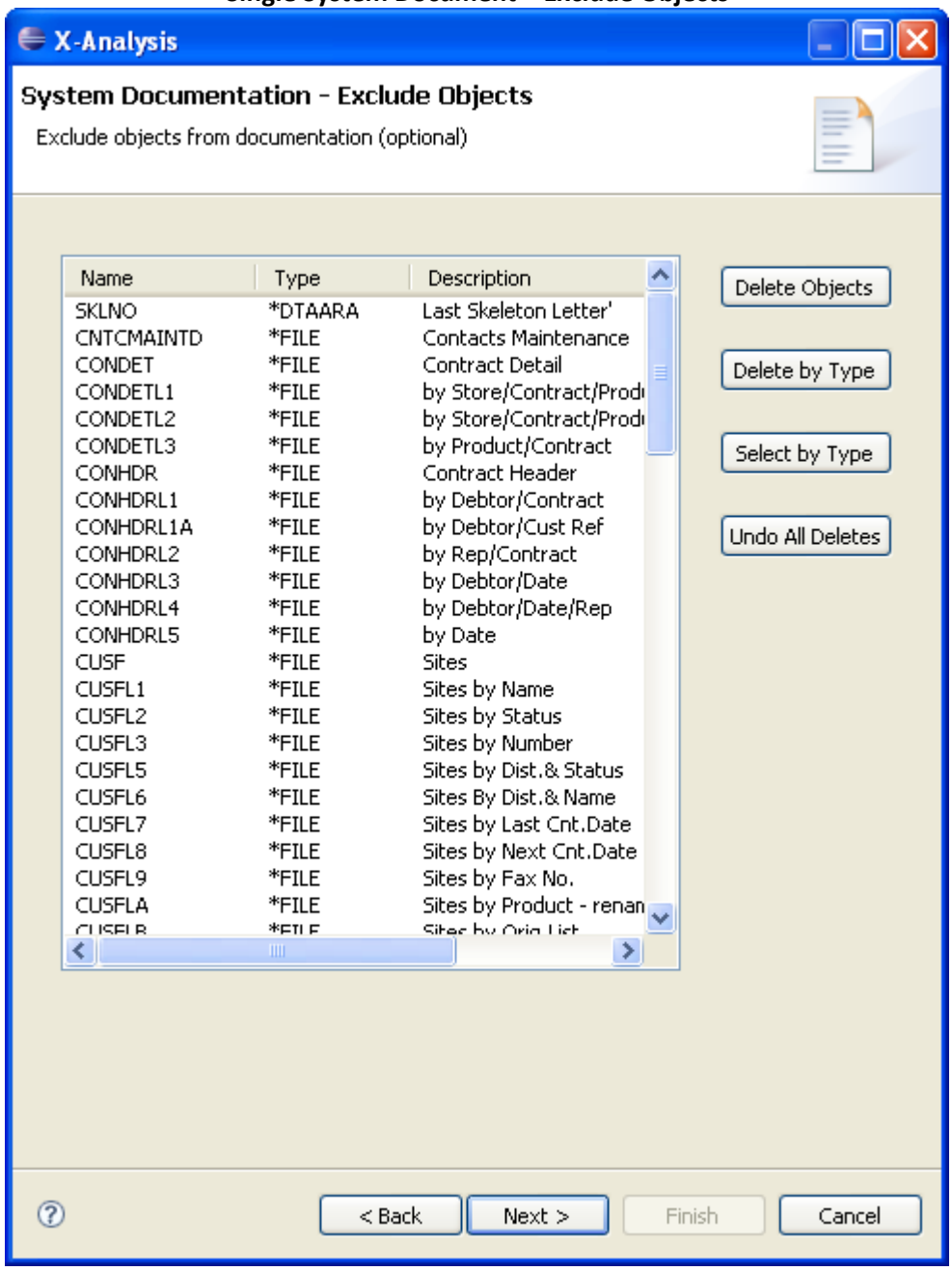
The **Overview Structure Chart** and the **Data Model Diagram** options mentioned in this dialog are only for the selected application area.

The wizard dialog displayed above has a section called **'Coverage of System Document**'. This section has three options; depending upon these three options, the System Document differs in its approach. Let us see how these three options work.

Detailed Object Documentation in Alphabetical Order

If the **Detailed Object Documentation in Alphabetical Order** option is selected, then the object documentation proceeds in ascending alphabetical order of the name of objects in the application area. The following dialog is displayed in the wizard:

Single System Document – Exclude Objects



The dialog offers removal of objects from the system documentation process, based on the name/type of objects. The selected name/type can be removed using the **Delete** buttons.

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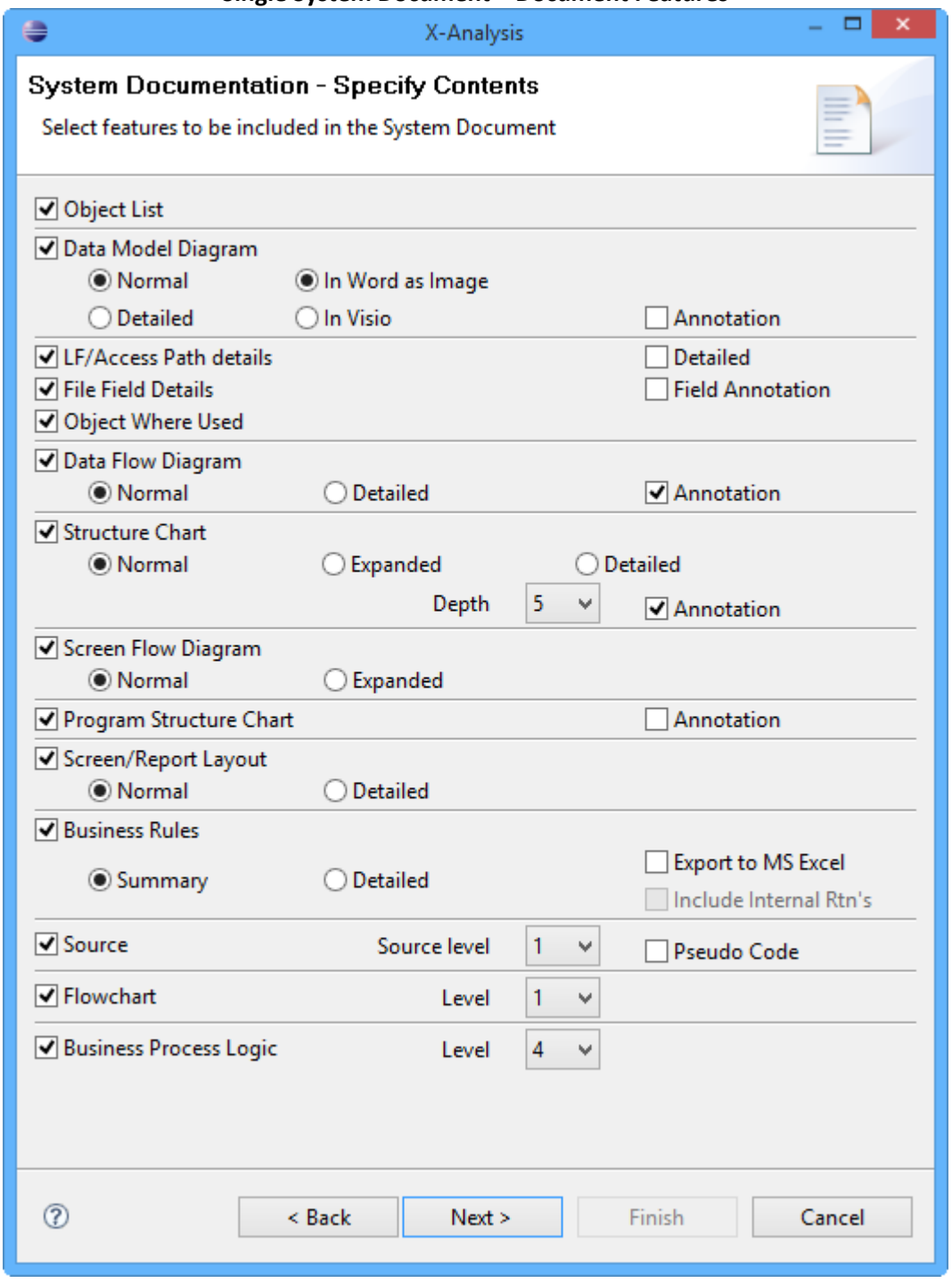
Single System Document – Document Features



Choose the options which you want to document from the above dialog.

Click **Next** which will display the following screen:

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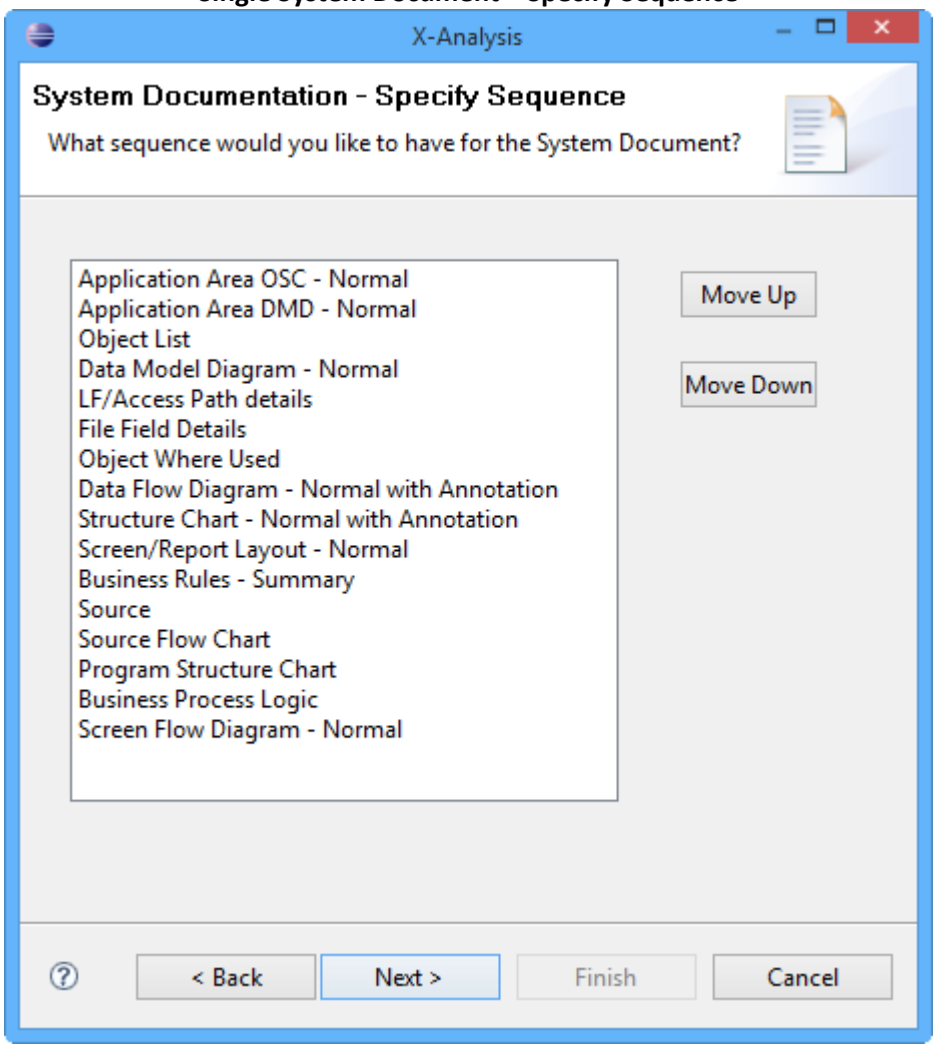
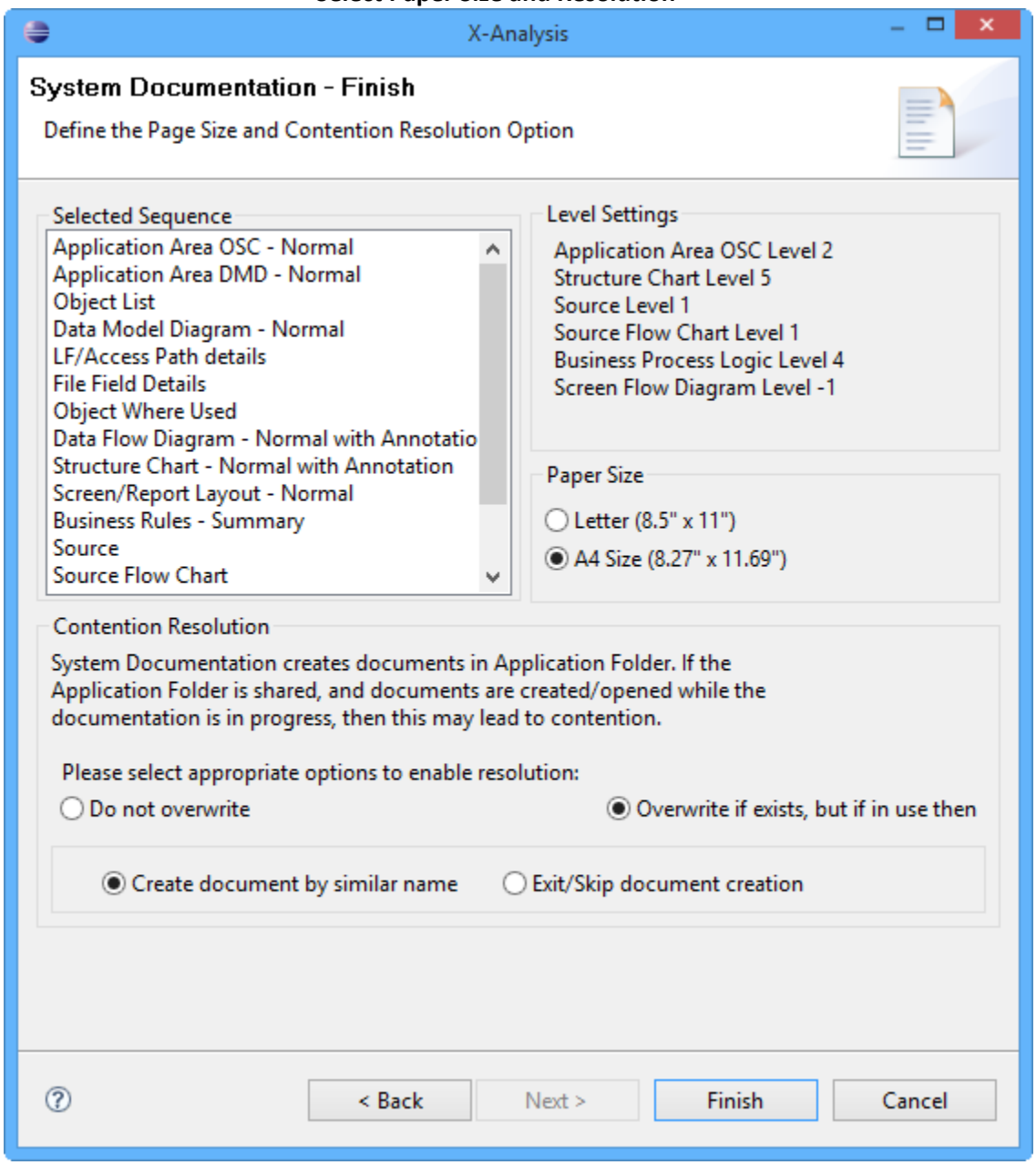
Single System Document – Specify Sequence



From the above screen, the user can re-sequence the options selected for System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all selections that he has made and can also define various options related to document formatting like 'Paper Size', 'Contention Resolution', etc.

Select Paper Size and Resolution

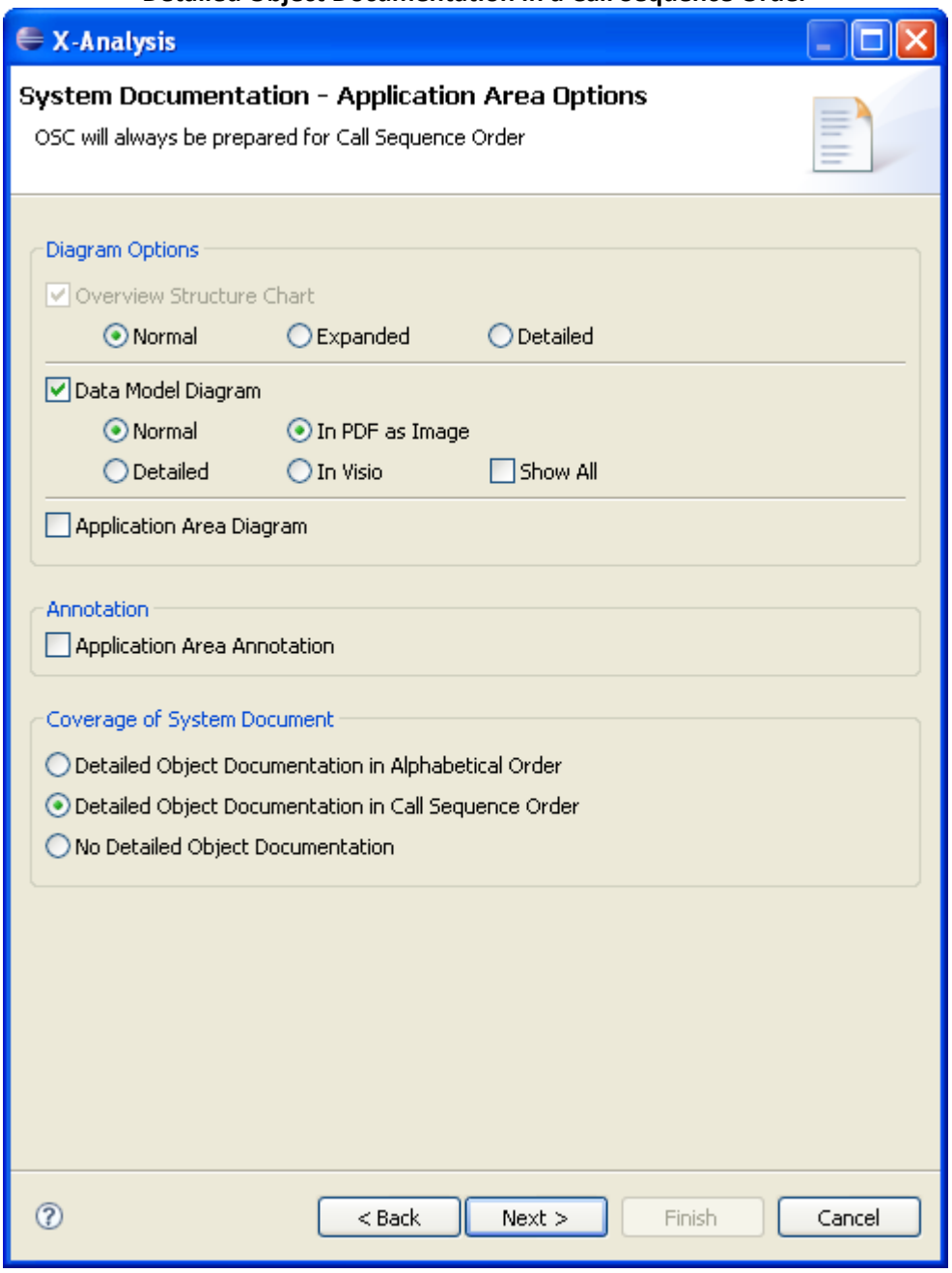

X-Analysis
System Documentation - Finish
Define the Page Size and Contention Resolution Option
Selected Sequence
Application Area OSC - Normal
Application Area DMD - Normal
Object List
Data Model Diagram - Normal
LF/Access Path details
File Field Details
Object Where Used
Data Flow Diagram - Normal with Annotatio
Structure Chart - Normal with Annotation
Screen/Report Layout - Normal
Business Rules - Summary
Source
Source Flow Chart
Level Settings
Application Area OSC Level 2
Structure Chart Level 5
Source Level 1
Source Flow Chart Level 1
Business Process Logic Level 4
Screen Flow Diagram Level -1
Paper Size
Letter (8.5" x 11")
A4 Size (8.27" x 11.69")
Contention Resolution
System Documentation creates documents in Application Folder. If the Application Folder is shared, and documents are created/opened while the documentation is in progress, then this may lead to contention.
Please select appropriate options to enable resolution:
Do not overwrite
Overwrite if exists, but if in use then
Create document by similar name
Exit/Skip document creation
< Back
Next >
Finish
Cancel

Click **Finish** to generate the document.

Detailed Object Documentation in Call Sequence Order

If the **Detailed Object Documentation in Call Sequence Order** option is selected, then the object documentation is based on the Overview Structure Chart for the selected application area. For this option, the Overview Structure Chart is always generated.

Detailed Object Documentation in a Call Sequence Order



Click **Next** to proceed further.

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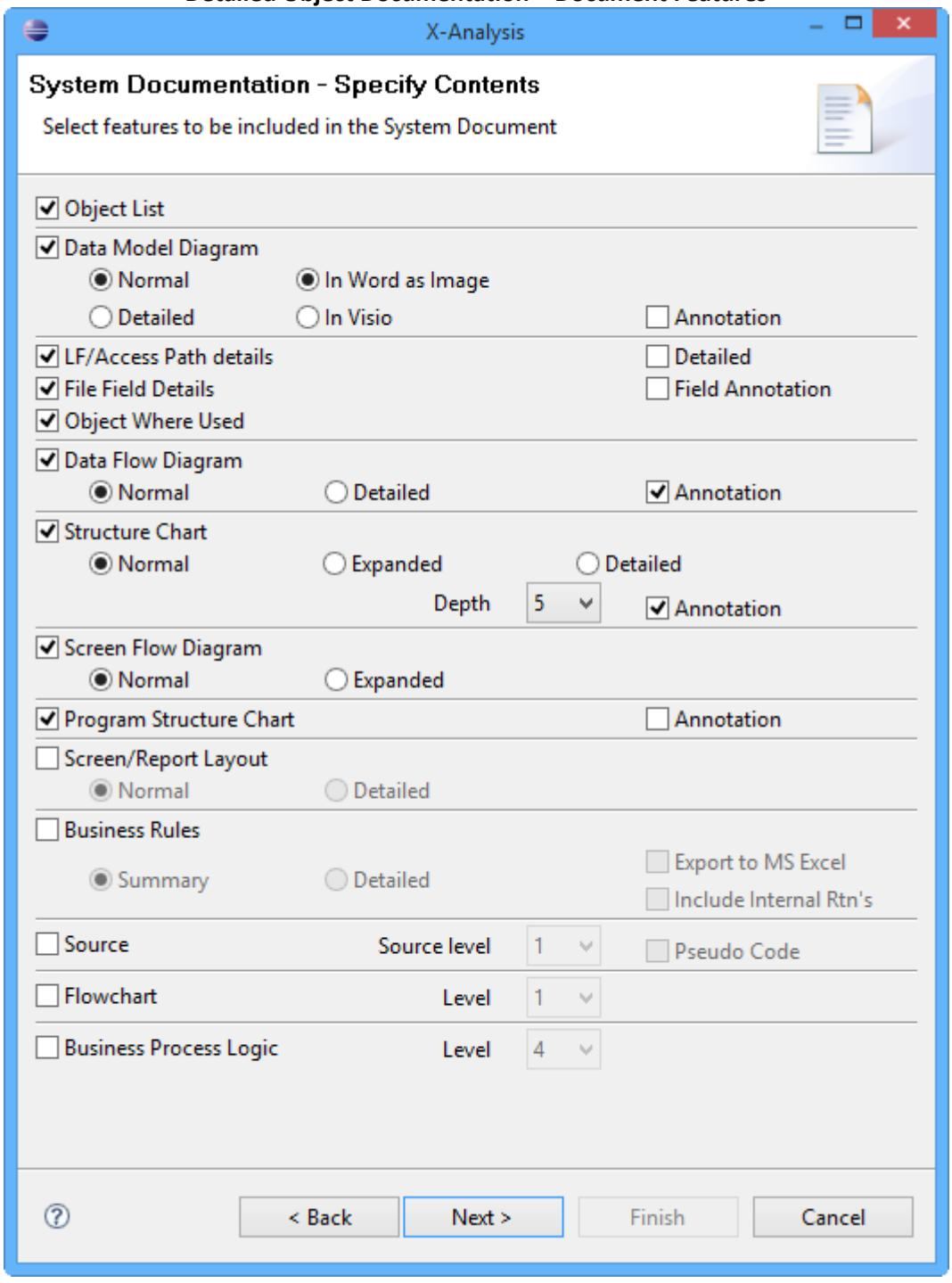
Detailed Object Documentation – Document Features



Choose the options which you want to document from the above dialog.

Click **Next** to proceed further.

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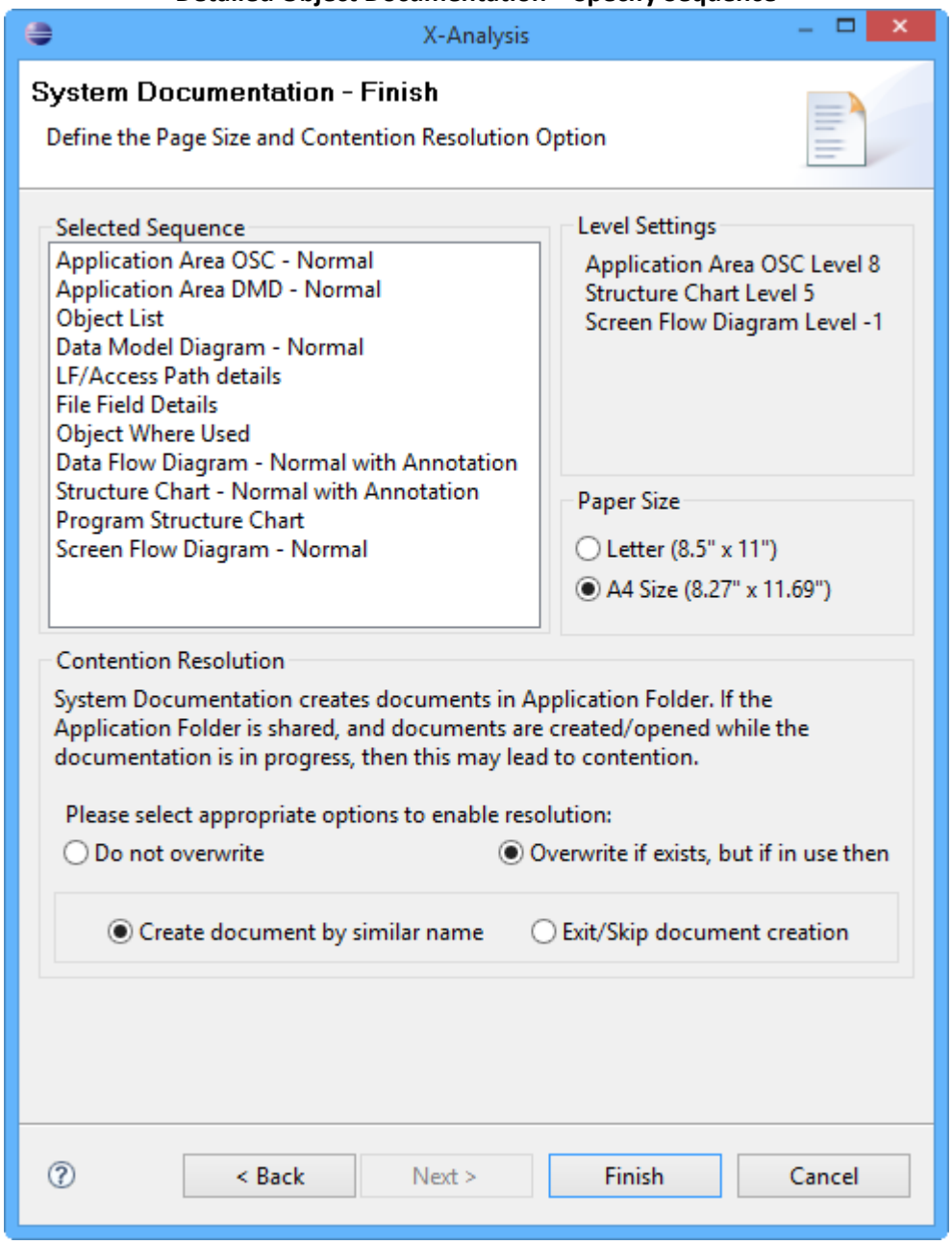
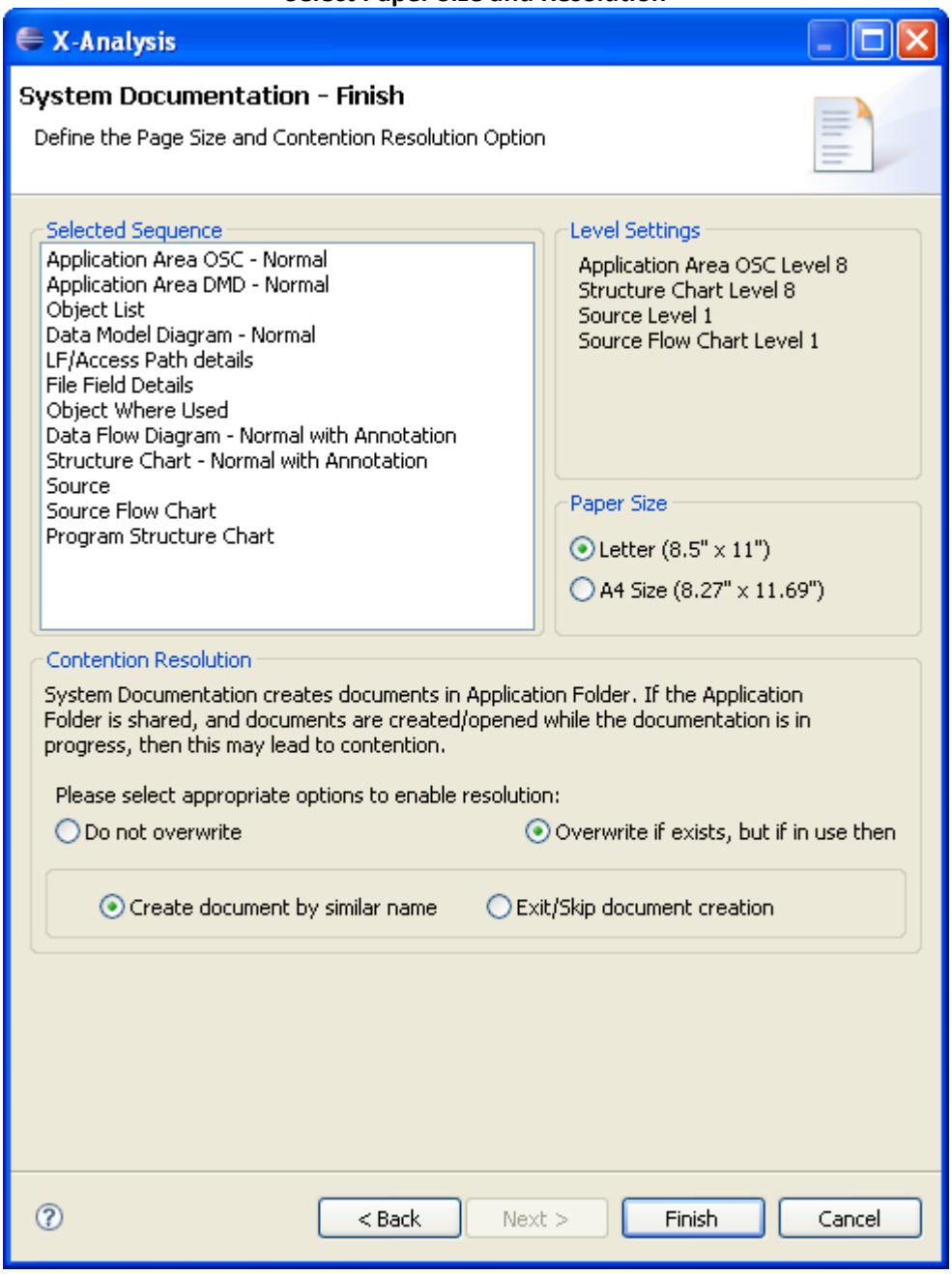
Detailed Object Documentation – Specify Sequence


X-Analysis
System Documentation - Finish
Define the Page Size and Contention Resolution Option
Selected Sequence
Application Area OSC - Normal
Application Area DMD - Normal
Object List
Data Model Diagram - Normal
LF/Access Path details
File Field Details
Object Where Used
Data Flow Diagram - Normal with Annotation
Structure Chart - Normal with Annotation
Program Structure Chart
Screen Flow Diagram - Normal
Level Settings
Application Area OSC Level 8
Structure Chart Level 5
Screen Flow Diagram Level -1
Paper Size
Letter (8.5" x 11")
A4 Size (8.27" x 11.69")
Contention Resolution
System Documentation creates documents in Application Folder. If the Application Folder is shared, and documents are created/opened while the documentation is in progress, then this may lead to contention.
Please select appropriate options to enable resolution:
Do not overwrite
Overwrite if exists, but if in use then
Create document by similar name
Exit/Skip document creation
< Back
Next >
Finish
Cancel

From the above screen, the user can re-sequence the options selected for System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all selections that he has made and can also define various options related to document formatting like 'Paper Size', 'Contention Resolution', etc.

Select Paper Size and Resolution

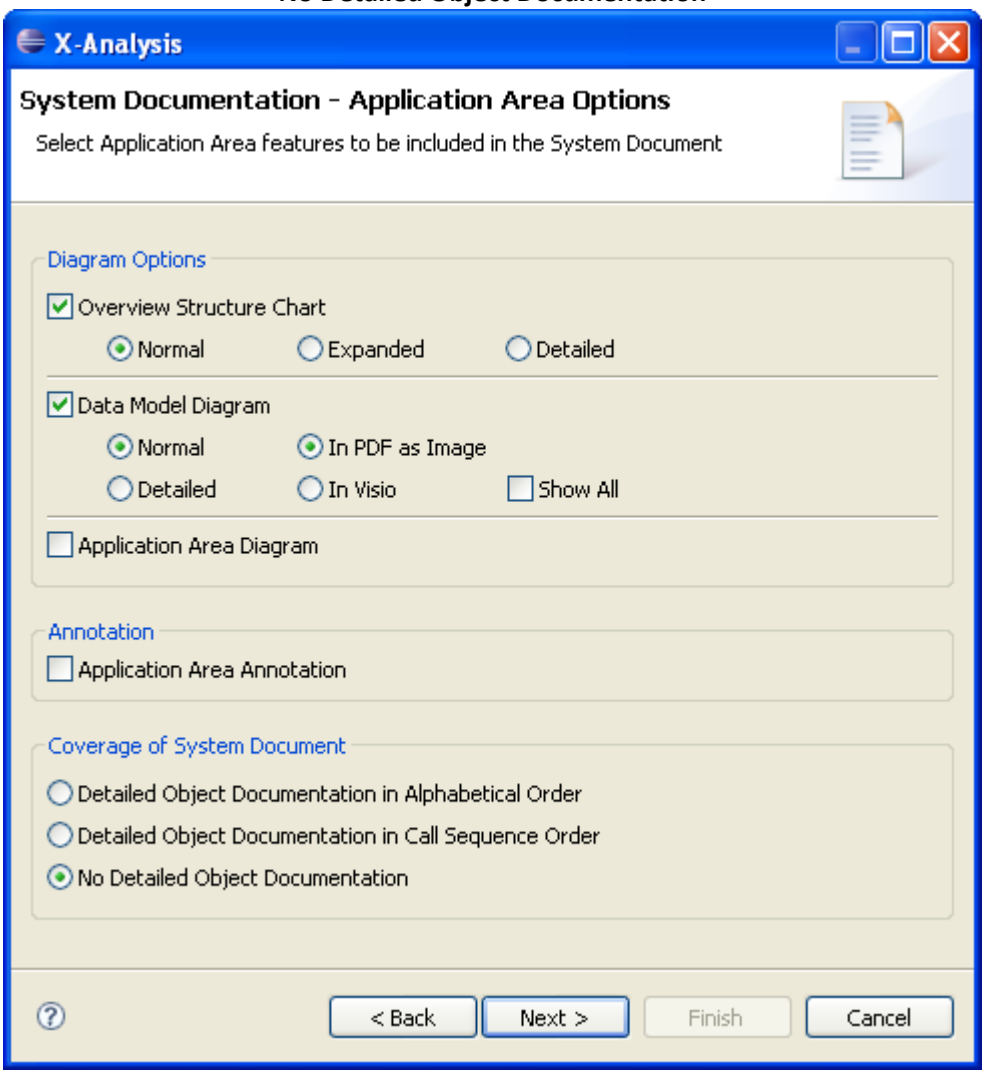

X-Analysis
System Documentation - Finish
Define the Page Size and Contention Resolution Option
Selected Sequence
Application Area OSC - Normal
Application Area DMD - Normal
Object List
Data Model Diagram - Normal
LF/Access Path details
File Field Details
Object Where Used
Data Flow Diagram - Normal with Annotation
Structure Chart - Normal with Annotation
Source
Source Flow Chart
Program Structure Chart
Level Settings
Application Area OSC Level 8
Structure Chart Level 8
Source Level 1
Source Flow Chart Level 1
Paper Size
Letter (8.5" x 11")
A4 Size (8.27" x 11.69")
Contention Resolution
System Documentation creates documents in Application Folder. If the Application Folder is shared, and documents are created/opened while the documentation is in progress, then this may lead to contention.
Please select appropriate options to enable resolution:
Do not overwrite
Overwrite if exists, but if in use then
Create document by similar name
Exit/Skip document creation
< Back
Next >
Finish
Cancel

Click **Finish** to generate the document.

No Detailed Object Documentation

If the **No Detailed Object Documentation** option is selected, then only the Overview Structure Chart and/or the Data Model Diagram as specified in the **Application Area Options** dialog is created.

No Detailed Object Documentation



Click **Next** to proceed further.

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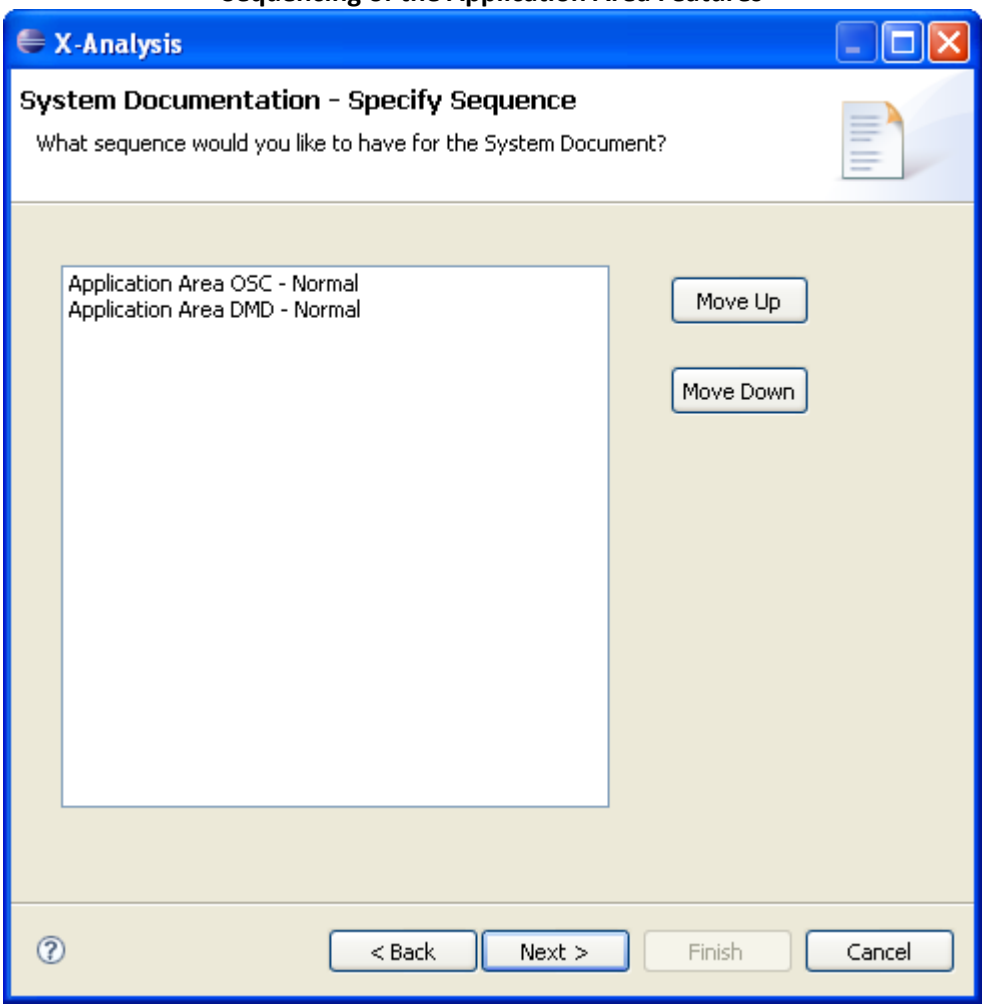
Sequencing of the Application Area Features



From the above screen, the user can re-sequence the options selected for System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all selections that he has made and can also define various options related to document formatting like 'Paper Size', 'Contention Resolution', etc.

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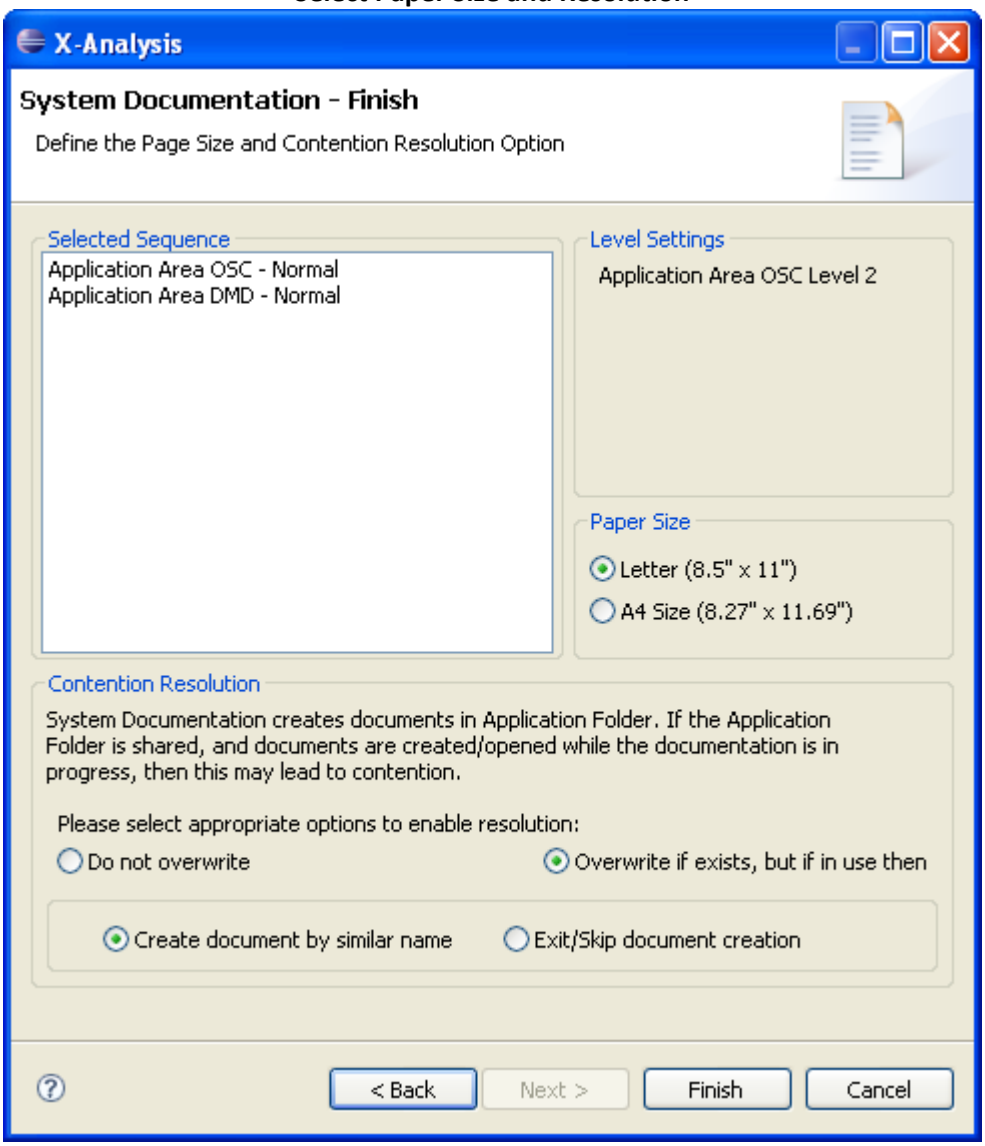
Select Paper Size and Resolution


X-Analysis
System Documentation - Finish
Define the Page Size and Contention Resolution Option
Selected Sequence
Application Area OSC - Normal
Application Area DMD - Normal
Level Settings
Application Area OSC Level 2
Paper Size
Letter (8.5" x 11")
A4 Size (8.27" x 11.69")
Contention Resolution
System Documentation creates documents in Application Folder. If the Application Folder is shared, and documents are created/opened while the documentation is in progress, then this may lead to contention.
Please select appropriate options to enable resolution:
Do not overwrite
Overwrite if exists, but if in use then
Create document by similar name
Exit/Skip document creation
< Back
Next >
Finish
Cancel

Click **Finish** to generate the document.

Document Application Area – Individual System Documents

Select the **Generate Individual System Documents** option, as displayed below:

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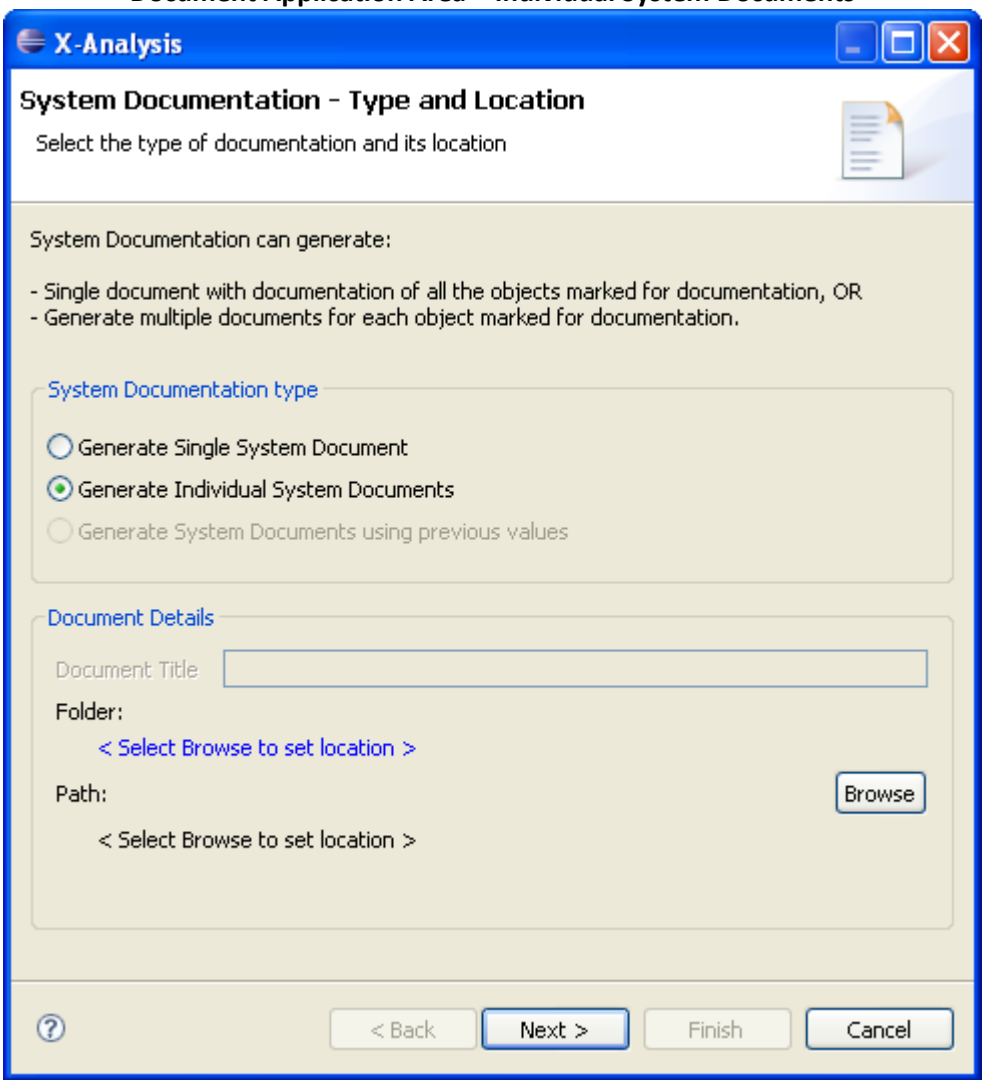
Document Application Area – Individual System Documents



Click **Browse** to select the desired location to save the document and enter a new filename, if required.

Document Folder

After selecting the desired location for documentation and providing the file name, the System Documentation wizard processes further, as shown below:

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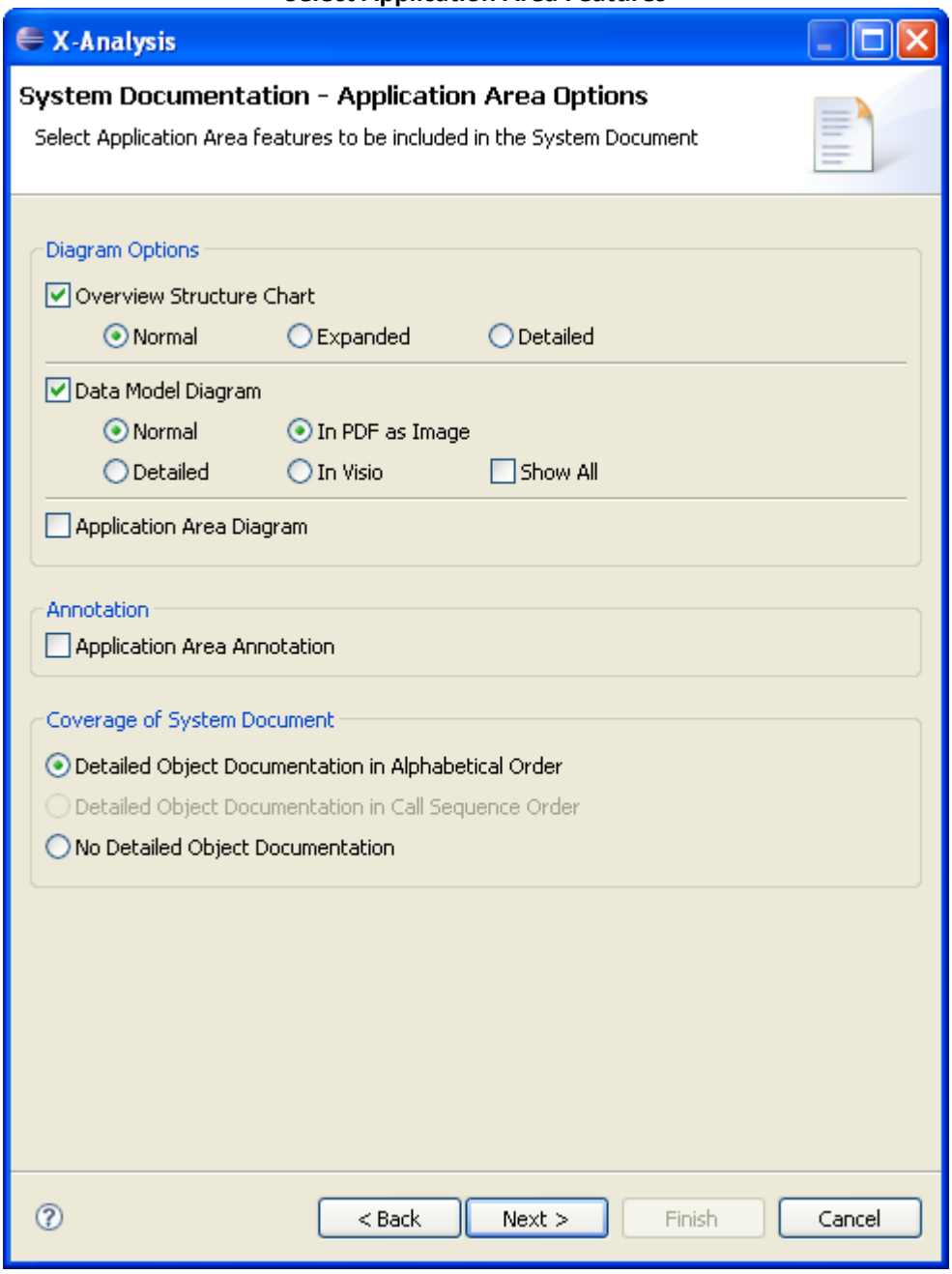
Select Application Area Features



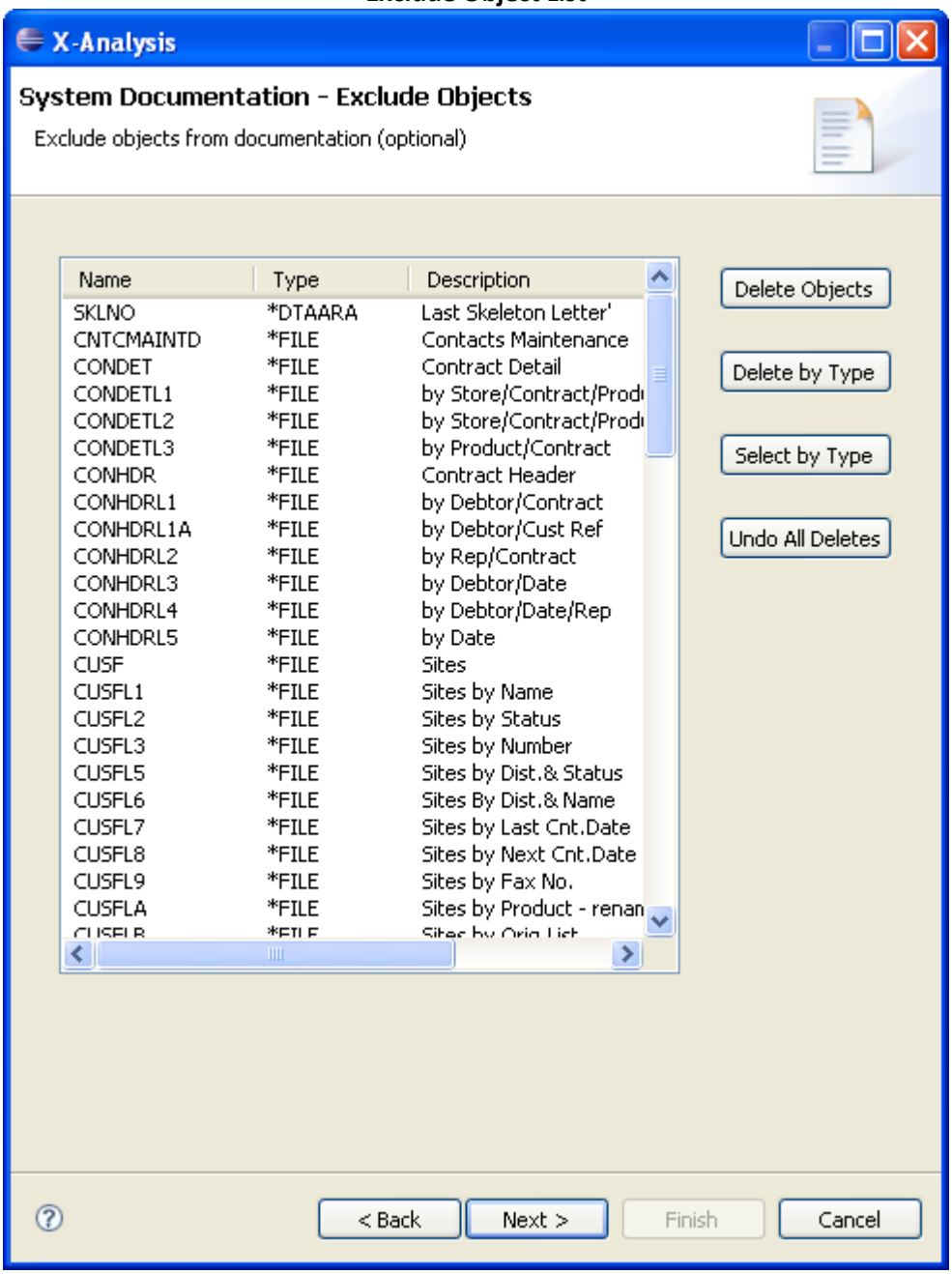
The **Overview Structure Chart** and the **Data Model Diagram** options mentioned in the above dialog box are only for the selected application area.

The wizard dialog displayed above has a section called **'Coverage of System Document**'. This section has two options, depending on which the System Document differs in its approach. Let us see how these two options work.

Detailed Object Documentation in Alphabetical Order

If the **Detailed Object Documentation in Alphabetical Order** is selected, then the object documentation generates in ascending alphabetical order of Object name from the application area. The following dialog is displayed in the wizard:

Exclude Object List



The dialog offers removal of objects from system documentation, based on name/type of objects. The selected name/type can be removed using the **Delete** buttons. Click **Next** to proceed further.

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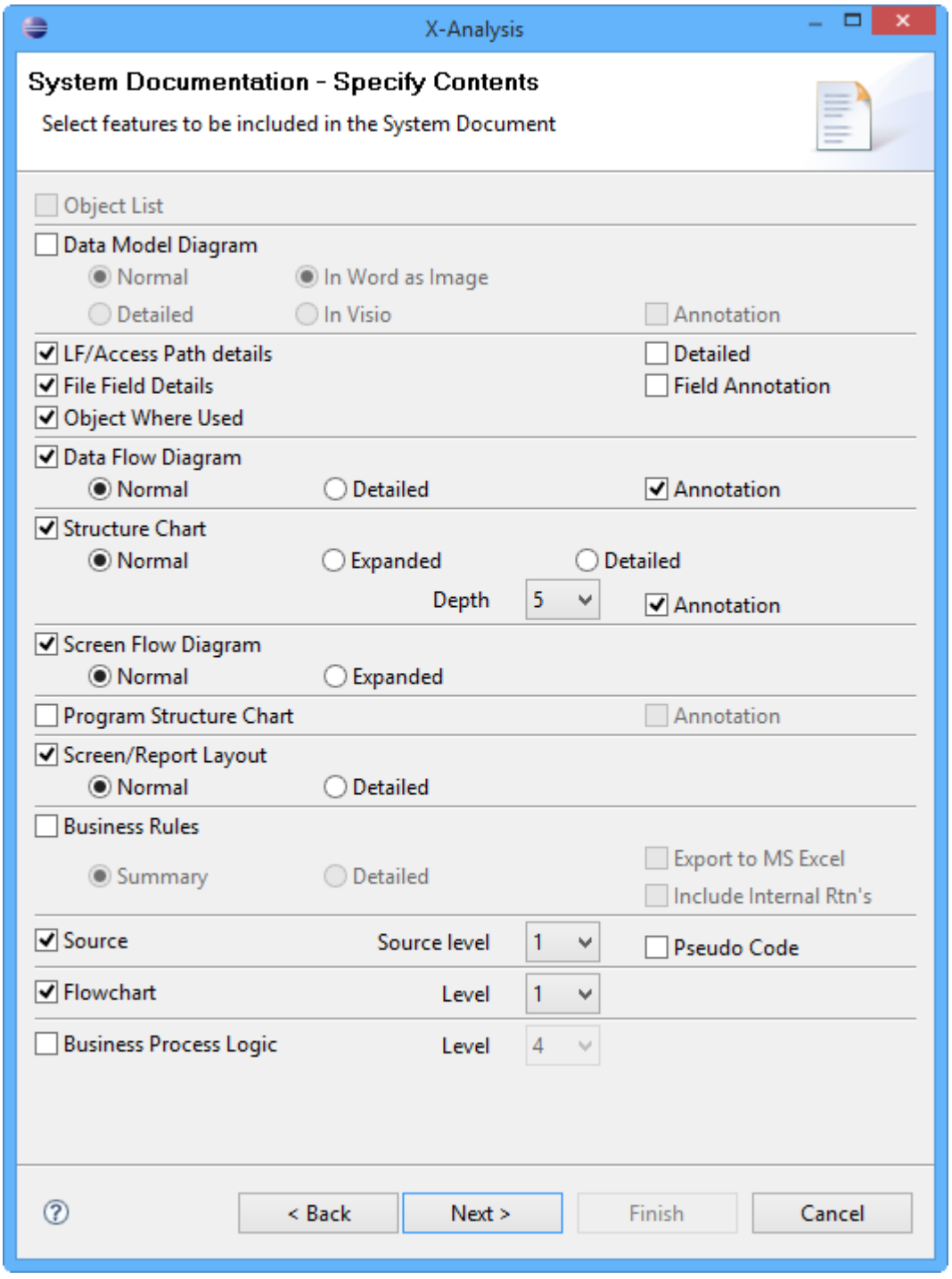
Features to Document



Choose the options which you want to document from the above dialog.

Click **Next** which will present the following screen:

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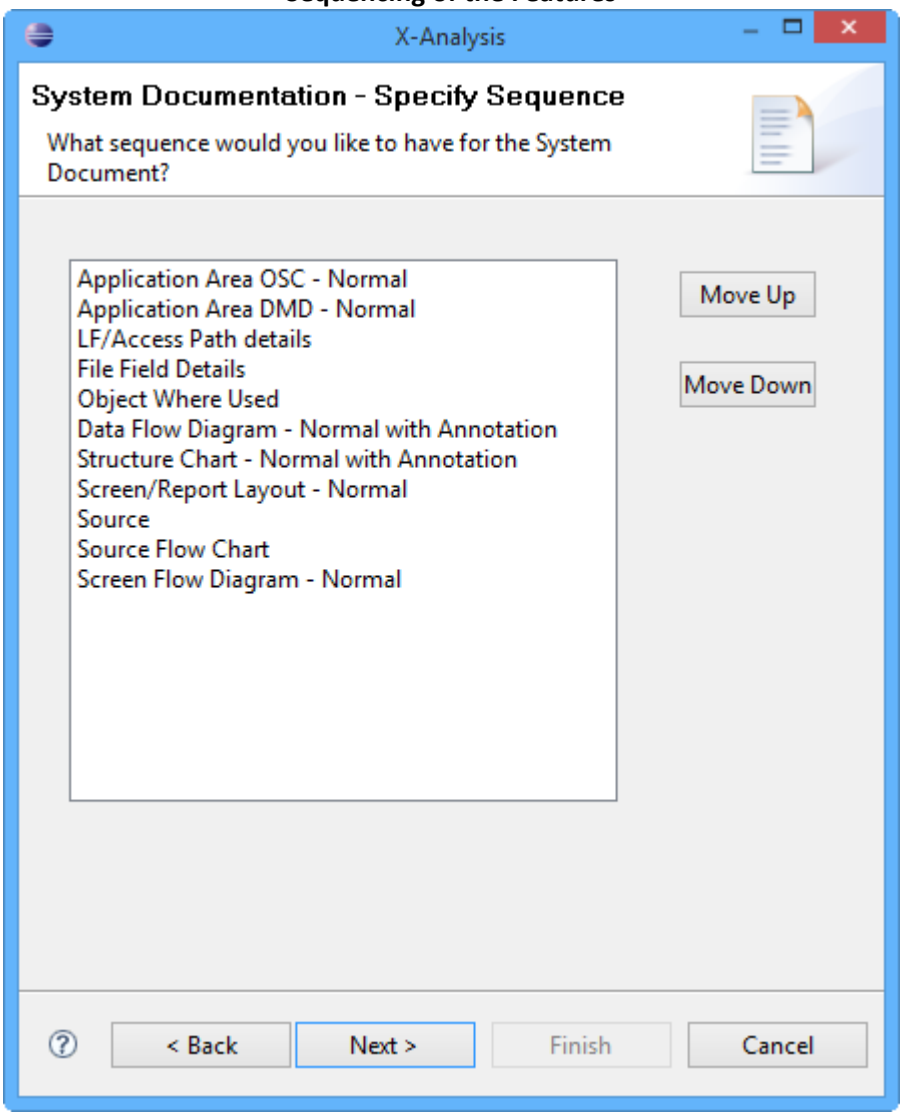
Sequencing of the Features



From the above screen, the user can re-sequence the options selected for System Documentation.

After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all selections that he has made and can also define various options related to document formatting like 'Paper Size', 'Contention Resolution', etc.

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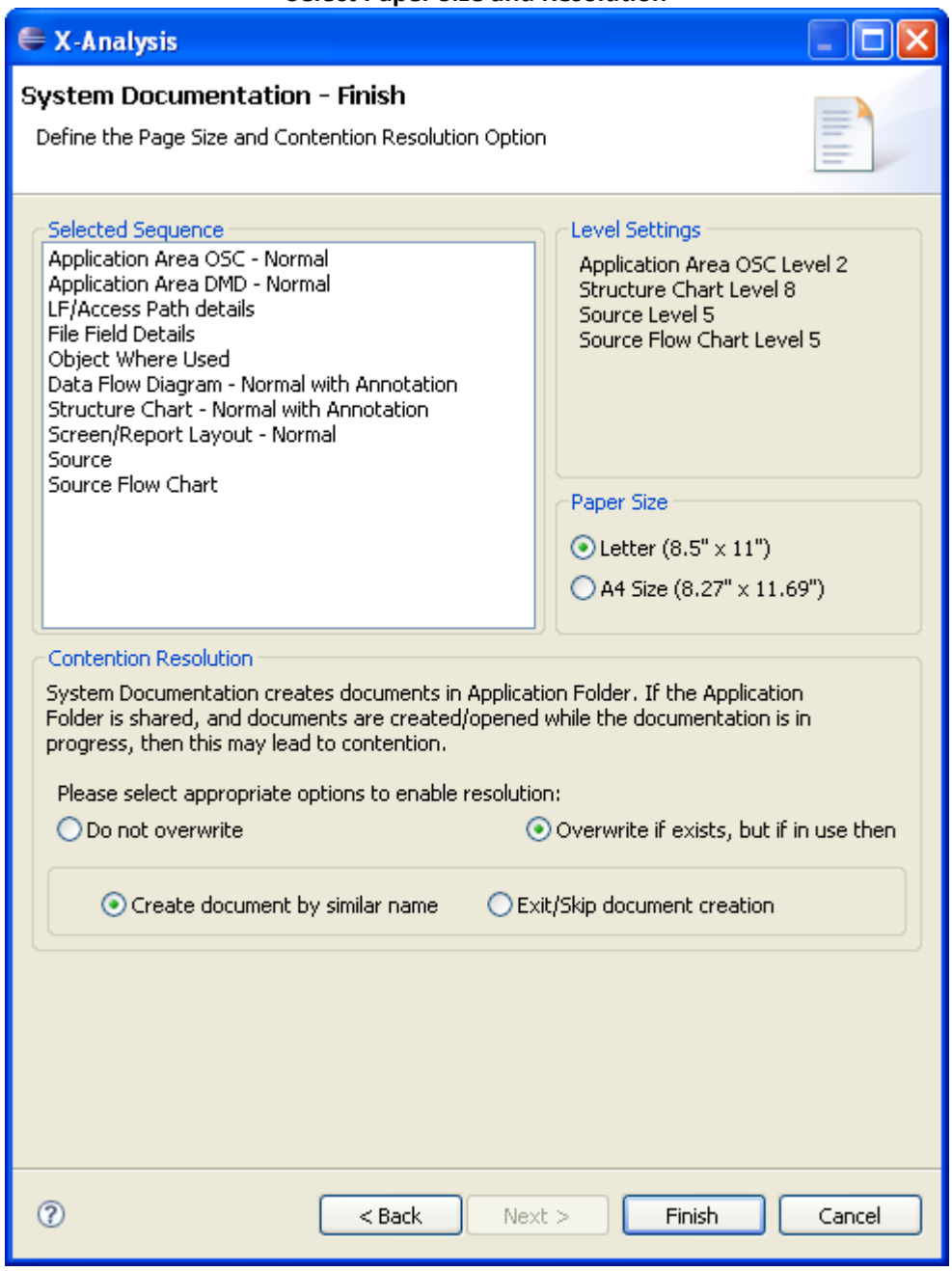
Select Paper Size and Resolution

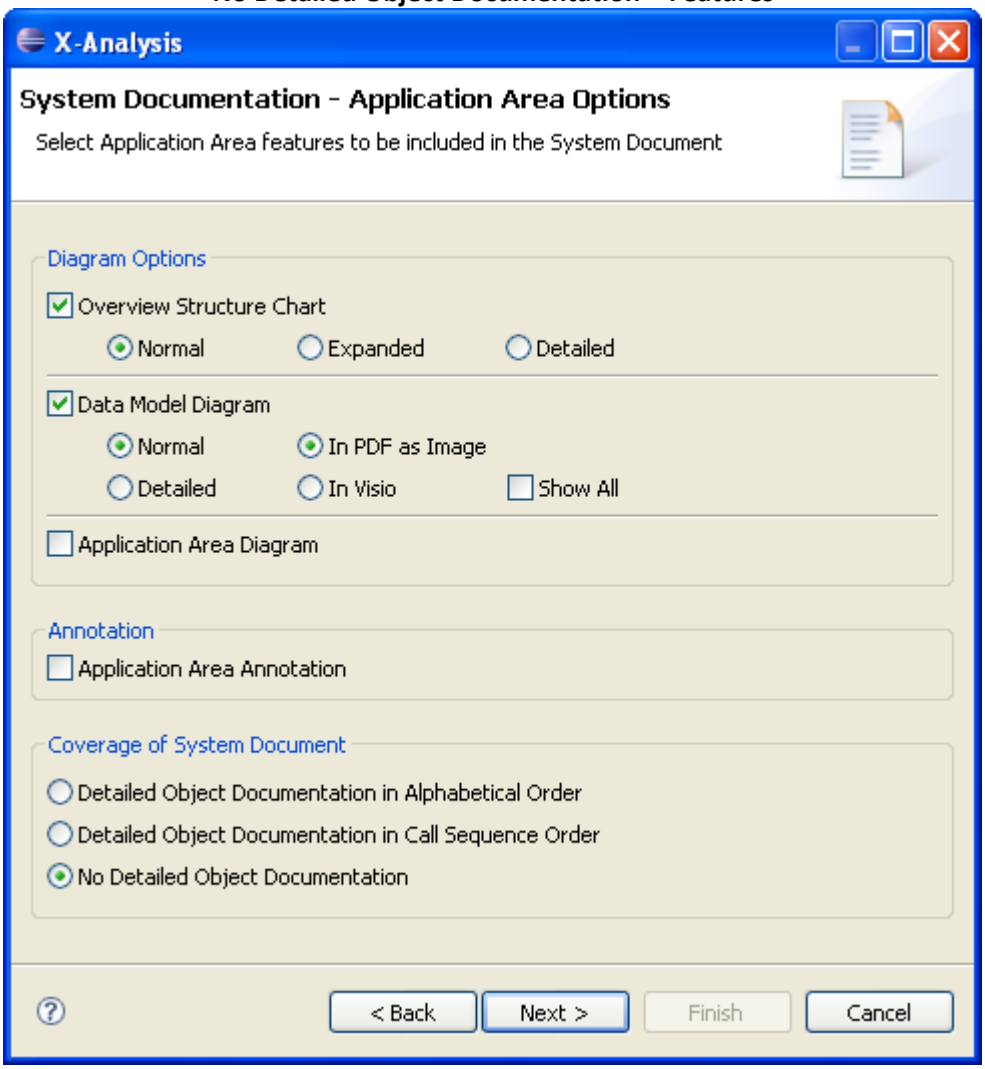

X-Analysis
System Documentation - Finish
Define the Page Size and Contention Resolution Option
Selected Sequence
Application Area OSC - Normal
Application Area DMD - Normal
LF/Access Path details
File Field Details
Object Where Used
Data Flow Diagram - Normal with Annotation
Structure Chart - Normal with Annotation
Screen/Report Layout - Normal
Source
Source Flow Chart
Level Settings
Application Area OSC Level 2
Structure Chart Level 8
Source Level 5
Source Flow Chart Level 5
Paper Size
Letter (8.5" x 11")
A4 Size (8.27" x 11.69")
Contention Resolution
System Documentation creates documents in Application Folder. If the Application Folder is shared, and documents are created/opened while the documentation is in progress, then this may lead to contention.
Please select appropriate options to enable resolution:
Do not overwrite
Overwrite if exists, but if in use then
Create document by similar name
Exit/Skip document creation
< Back
Next >
Finish
Cancel

Click **Finish** to generate the document.

No Detailed Object Documentation

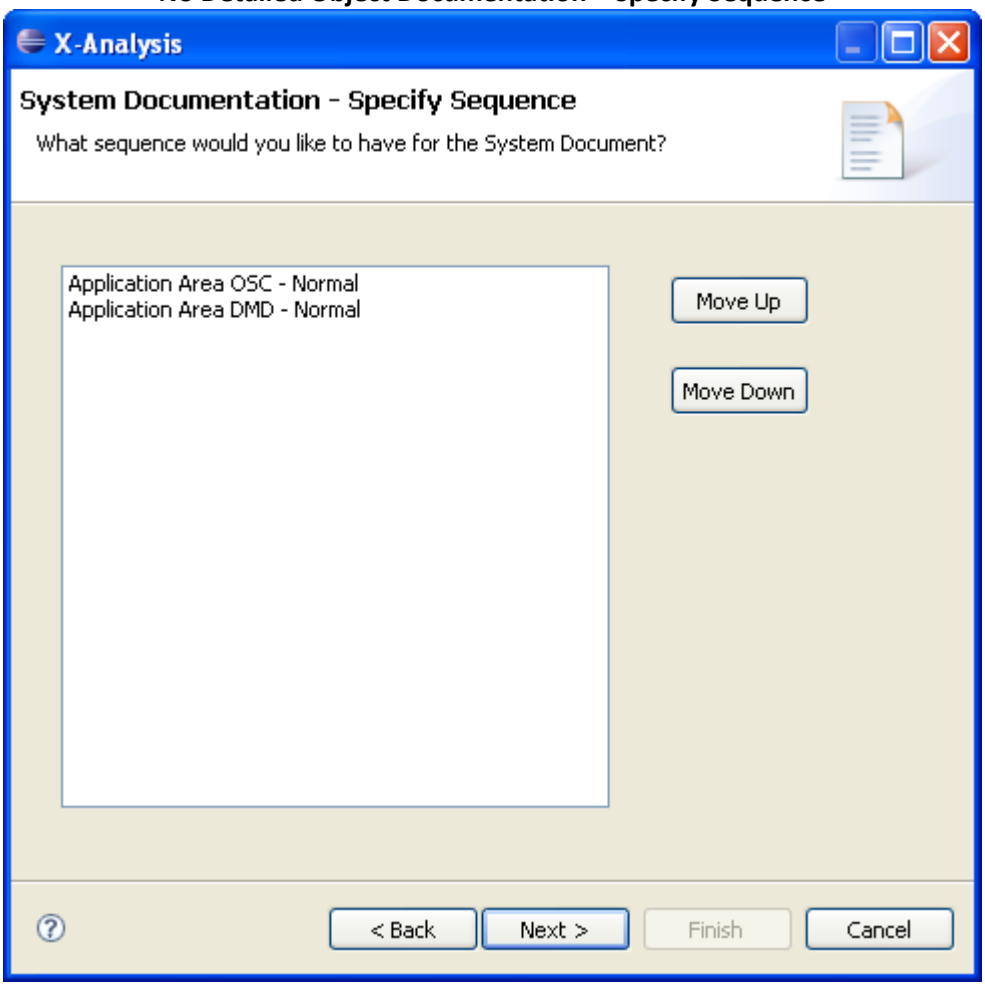
If the **No Detailed Object Documentation** option is selected, then only the Overview Structure Chart and/or the Data Model Diagram as specified in the **Application Area Options** dialog is created.

No Detailed Object Documentation – Features



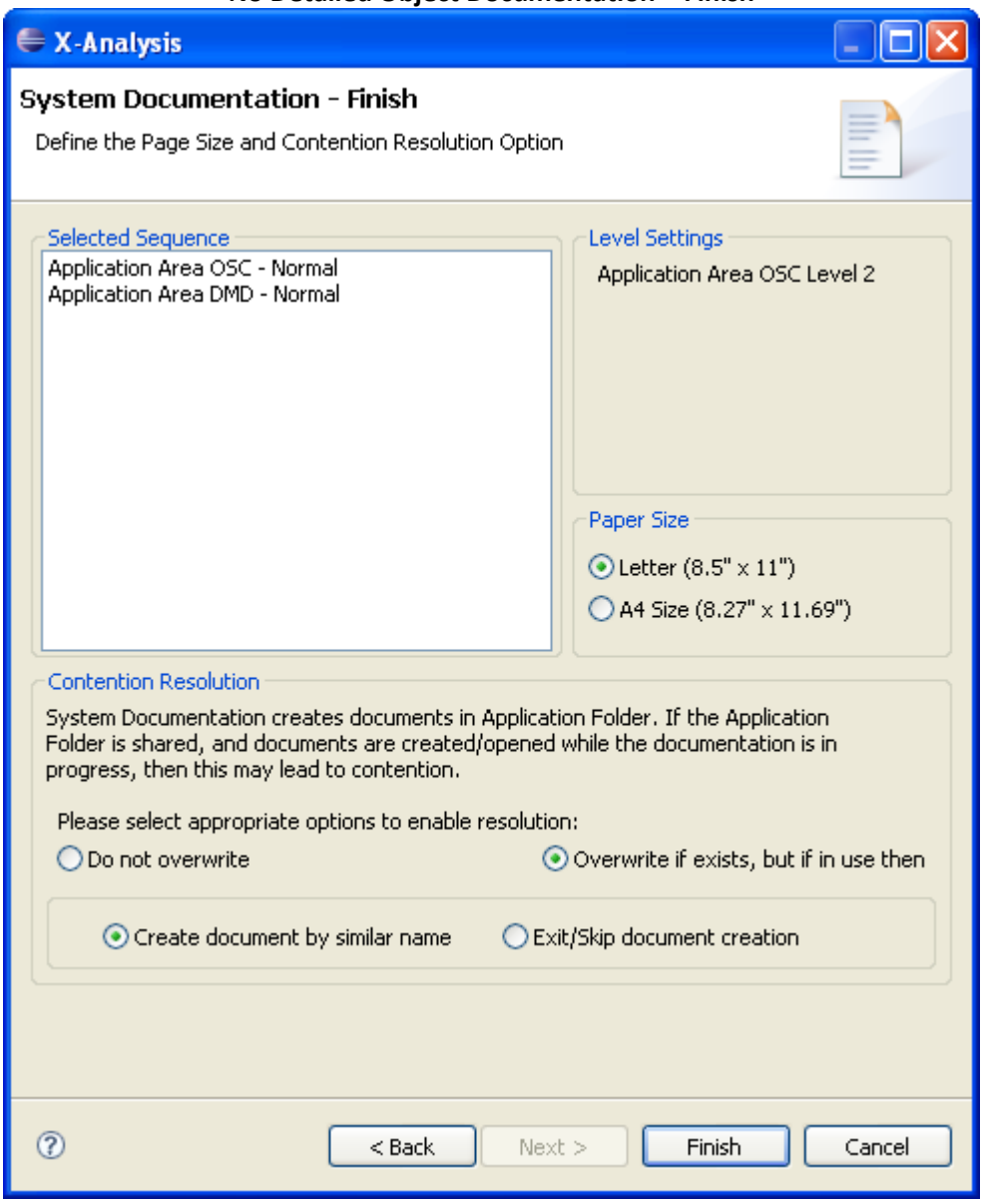
Click **Next** to proceed further.

No Detailed Object Documentation – Specify Sequence



From the above screen, the user can re-sequence the options selected for System Documentation. After re-sequencing, click **Next** to reach the final step of documentation wizard. Here, the user can see all the selections that he has made and can also define various options related to document formatting like 'Paper Size', 'Contention Resolution', etc.

No Detailed Object Documentation – Finish


X-Analysis
System Documentation - Finish
Define the Page Size and Contention Resolution Option
Selected Sequence
Application Area OSC - Normal
Application Area DMD - Normal
Level Settings
Application Area OSC Level 2
Paper Size
Letter (8.5" x 11")
A4 Size (8.27" x 11.69")
Contention Resolution
System Documentation creates documents in Application Folder. If the Application Folder is shared, and documents are created/opened while the documentation is in progress, then this may lead to contention.
Please select appropriate options to enable resolution:
Do not overwrite
Overwrite if exists, but if in use then
Create document by similar name
Exit/Skip document creation
< Back
Next >
Finish
Cancel

Click **Finish** to generate the document.

System Document using previous values

We have already discussed this topic under the **Marking the individual objects/complete list** section.

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Documenting an Entire Application

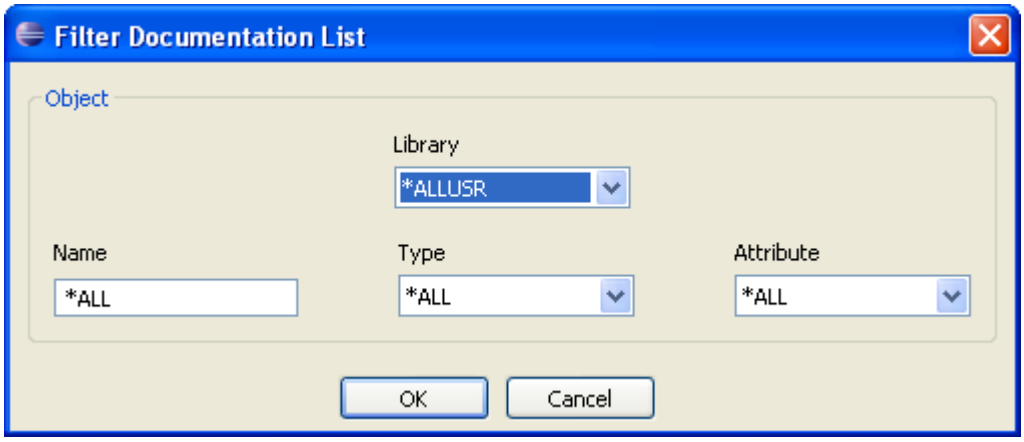
The **Document Entire Application** option documents all information about objects belonging to the selected application. This option is available on the context menu of an application and invokes the **System Documentation Wizard**. The procedure for documenting an entire application is same as the procedure of documenting an application area.

Document Changed Objects

The **Document Changed Objects** option documents those objects which have changed since the last initialisation was run on the cross-reference library. This option is available on the context menu on a cross-reference library.

The **Document Changed Objects** provides a filter criterion for the System Documentation process. The user can select the object's library, name, type and attribute, as per the requirement.

Filter Documentation List



Viewing the Generated Document

The default Application Folder for a specific application can be opened by selecting the **Open Application Folder** option from the X-Analysis menu from menu bar.

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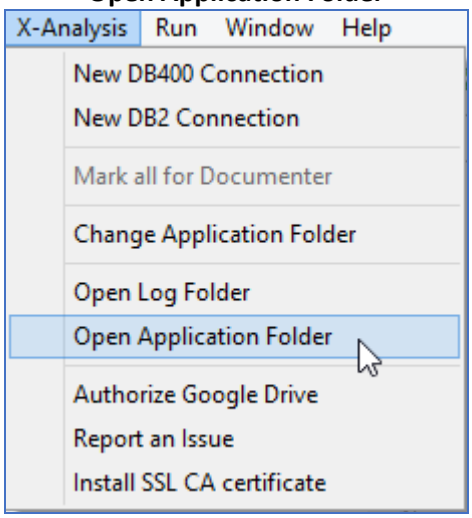
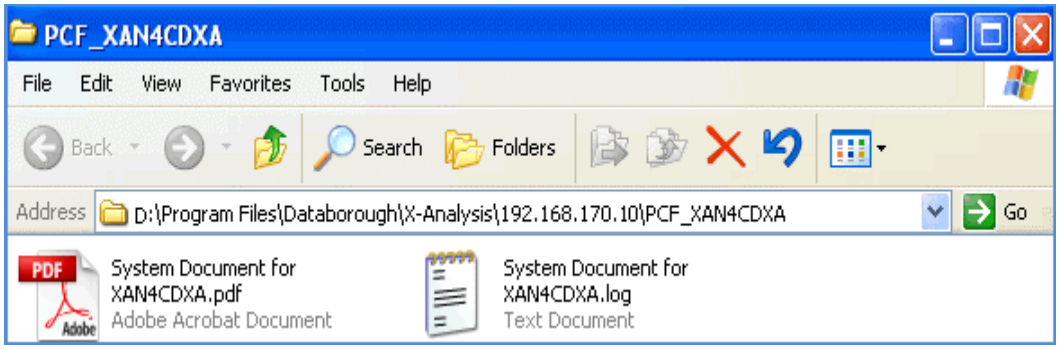
Open Application Folder

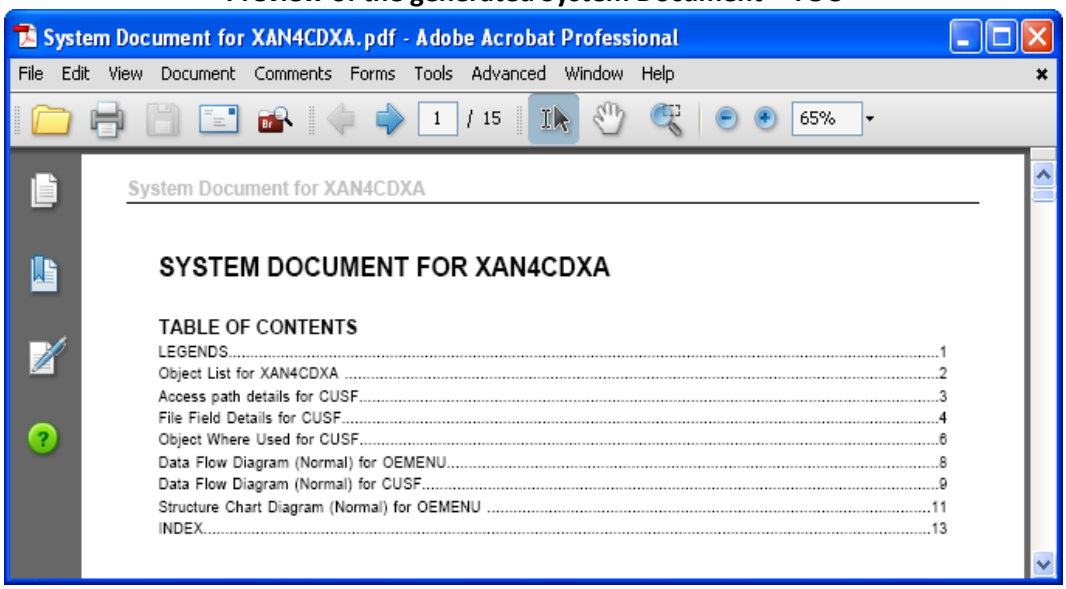


Locate the document in the specified save location and double-click on it to open the document.

Document Folder



Preview of the generated System Document – TOC



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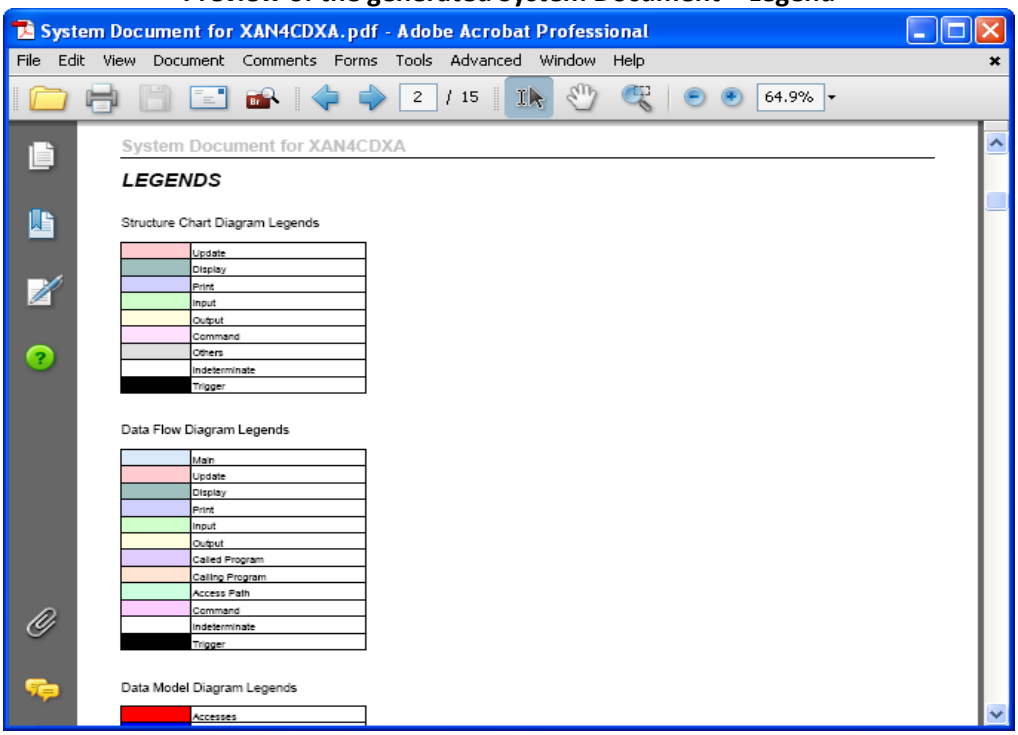
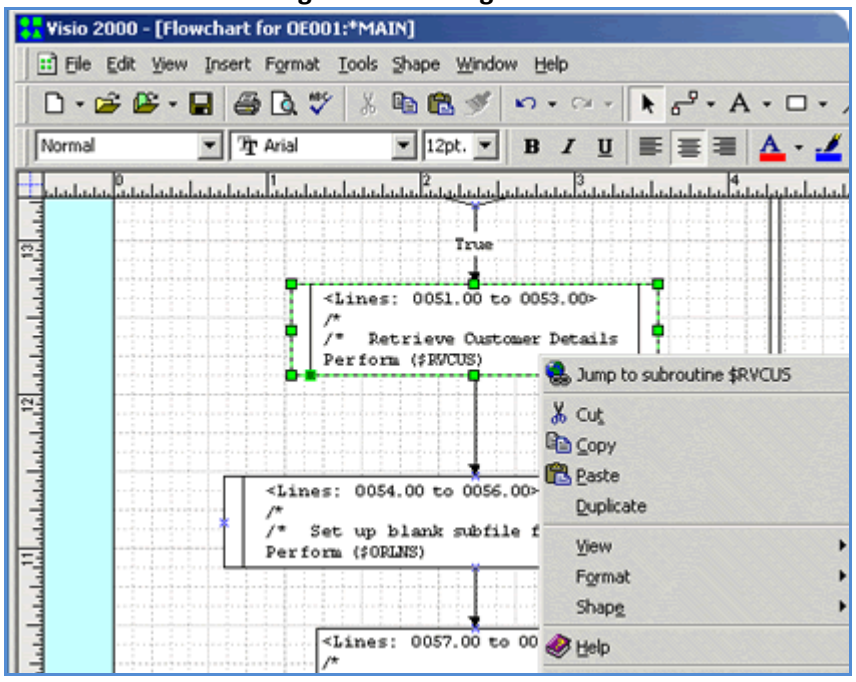
Preview of the generated System Document – Legend



If the **Flowchart** option is selected, then the flowchart will be generated using Microsoft Visio, and its link is placed in the System Document.

Flowchart generated using Microsoft Visio



LIMITATIONS OF X-ANALYSIS SYSTEM DOCUMENTER

Editing another Word Document

X-Analysis uses OLE Automation to send data to Microsoft Word. This depends on Automation objects provided by Microsoft Word. Automation objects by Microsoft Word have the limitation that when Automation is used on a Word document, then, editing of another Word document may get affected or may interfere with the automation process of the system document.

The following problems may be noticed in the document being edited:

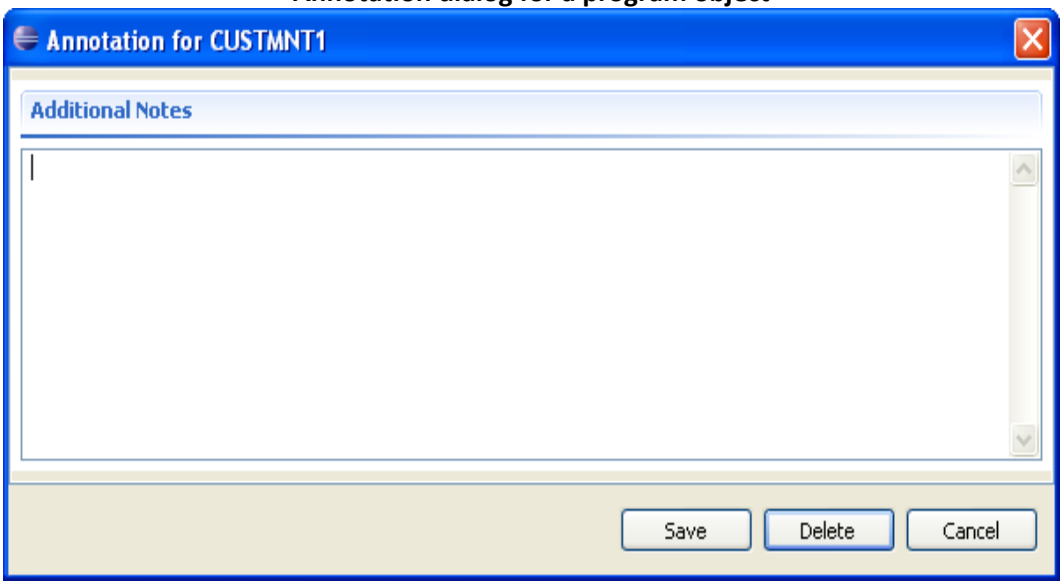
- The cursor will frequently change to hourglass.
- Text once selected may not be unselected.
- After clicking a menu it may disappear by itself.
- Opening a dialog may end/block the documentation process abruptly.

USING THE ANNOTATOR

Annotate option

The **Annotate** option is available on the context menu of an object or field name. Selecting the **Annotate** option invokes a dialog box. Provide the required text and click **Save**. The annotation is stored in a table available in the cross-reference library.

Annotation dialog for a program object



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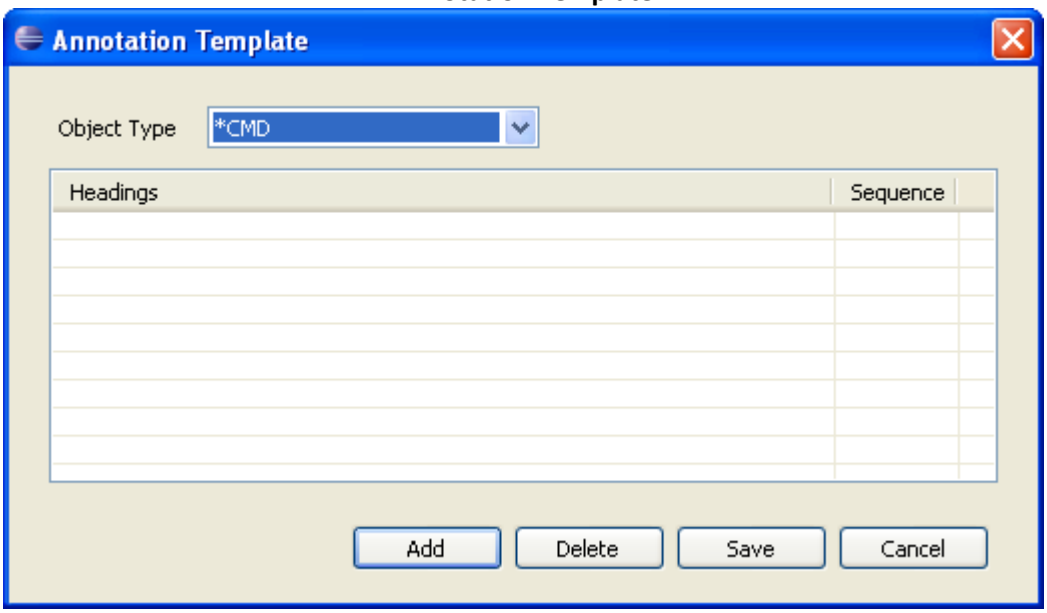
Object type-based Annotation

The annotations based on the Object type are saved in a table available in the cross-reference library.

Select the **All Objects** option from the navigation pane, and opt for the context menu. Then, select the **Annotation Template** option. This invokes a dialog box as shown here:

Annotation Template



From the **Object Type** drop-down, select the required object type. After that, provide appropriate headings for the object type and click **Save**. When you now annotate the specified object type you can see the prescribed heading.

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Appendix A – X-Analysis Offline

The X-Analysis Client can also be used to run in offline mode. The offline mode of X-Analysis is based on the IBM DB2 database. X-Analysis offline can be used in the following scenario:

- Analysis of PC-based application (which uses the IBM i) – Java, VB, VB.Net and PowerBuilder, by using XA-Open of Fresche Legacy. For details on XA-Open, refer to the **XA-Open User Manual**.

X-Analysis Offline Prerequisites

Ensure that your environment meets the following requirements:

- IBM DB2 Express-C must be installed.
- Set X-Analysis Preferences
    - Before connecting the offline X-Analysis, you need to specify the DB2 port number in the X-Analysis Preferences settings (in case different from the default port number 50000).
- XAN4CDXA Configurator can be optionally run to setup the demo application XAN4CDXA

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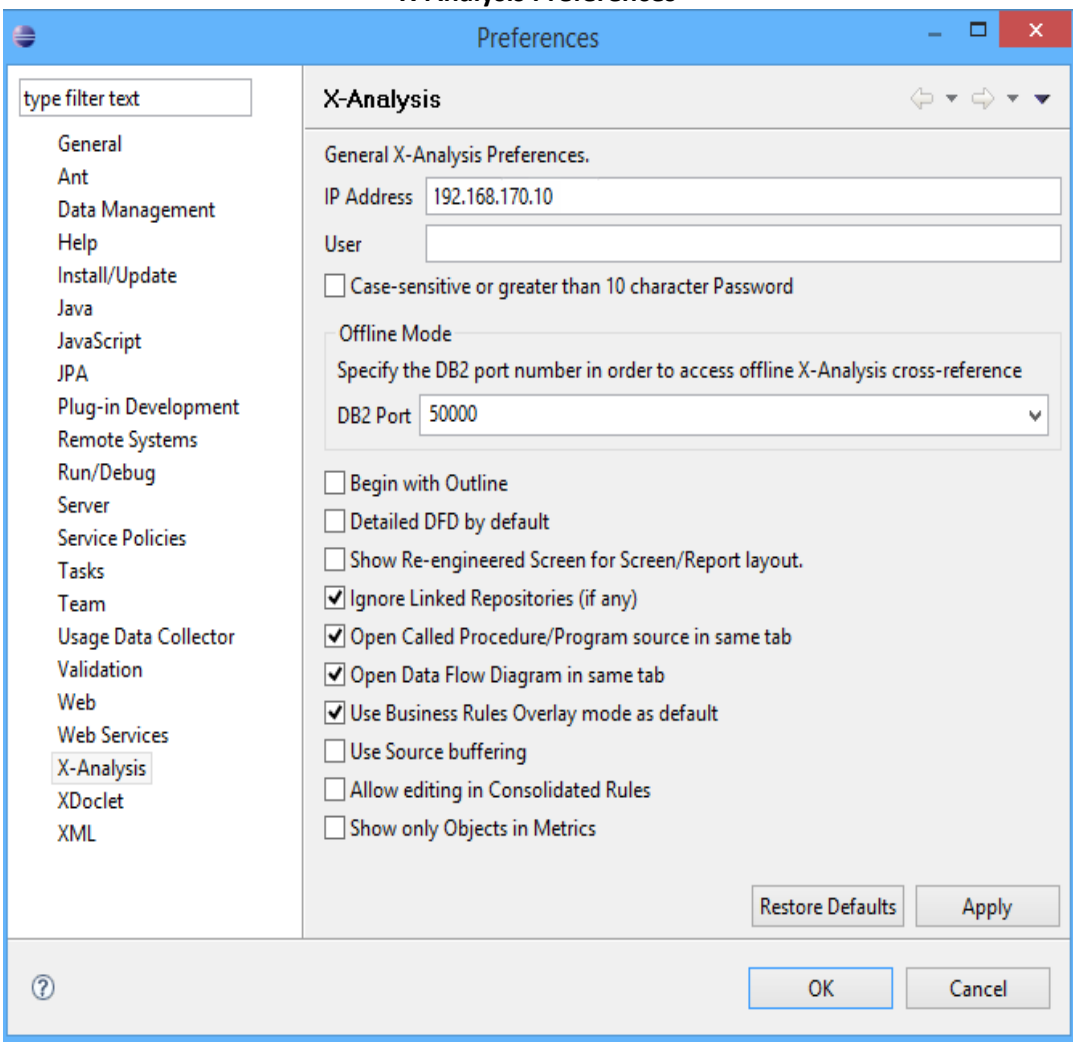
X-Analysis Preferences



START X-ANALYSIS OFFLINE

Select the **New DB2 Connection** option and provide the required details in the dialog box, as shown below:

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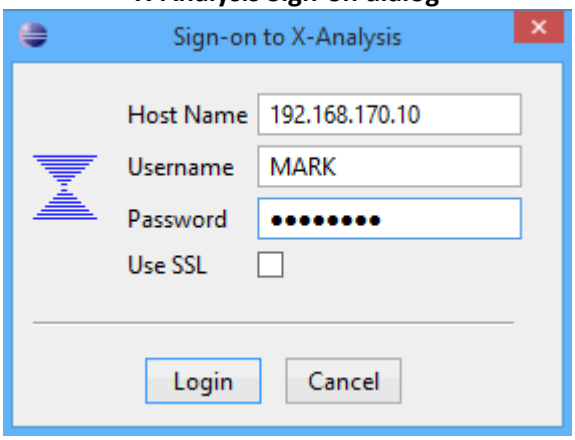
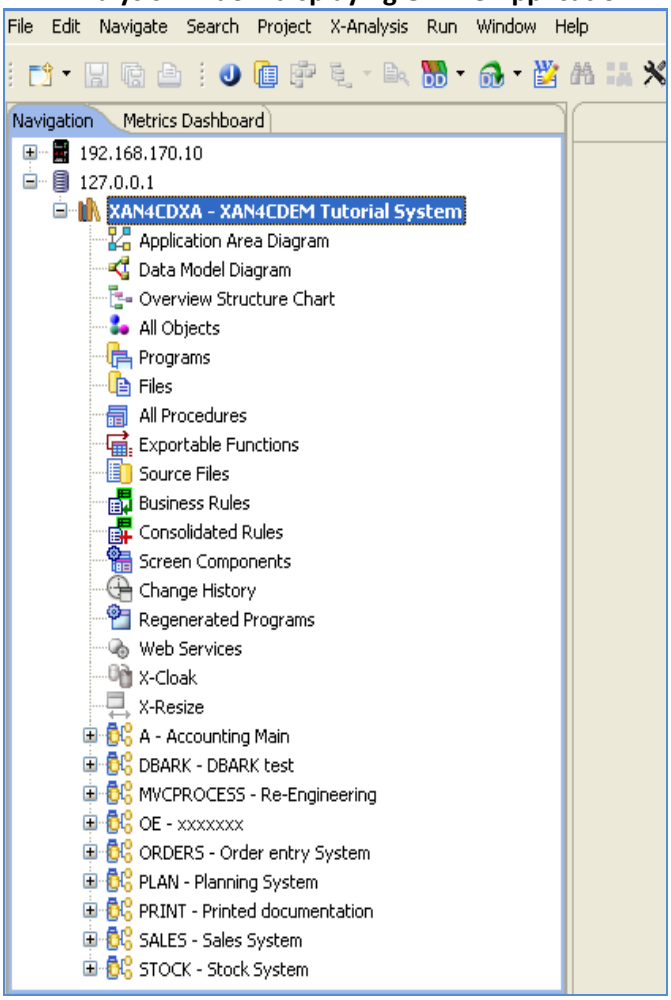
X-Analysis Sign-on dialog



Then, click **Login** to start offline session of X-Analysis. On successful logon, the tutorial application **XAN4CDXA** can be seen located under the navigation view (displayed below):

X-Analysis window displaying Offline Application



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Appendix B – Enabling the SEU Interface

CREATE USER PROFILE XAN4SEU

When browsing source code using the IBM i (**AS400) SEU**, it is necessary to be logged in as user **XAN4SEU**. The following gives instructions for creating the correct user profile.

Step 1 Logon as **QSECOFR**.

Step 2 Create **XAN4SEU** user profile.

Use the **CRTUSRPRF** command to create the **XAN4SEU** user profile. Make sure that the following parameters are set:

User Password : **XAN4SEU**

User Class : *PGMR

Initial Program : XSEUCLP

Library : XAOBJ

```
                      Create User Profile (CRTUSRPRF)


 Type choices, press Enter.

 User profile . . . . . . . . . . > XAN4SEU       Name
 User password  . . . . . . . . .   *USRPRF       Name, *USRPRF, *NONE
 Set password to expired  . . . .   *NO           *NO, *YES
 Status . . . . . . . . . . . . .   *ENABLED      *ENABLED, *DISABLED
 User class . . . . . . . . . . . > *PGMR       *USER, *SYSOPR, *PGMR...
 Assistance level . . . . . . . .   *SYSVAL       *SYSVAL, *BASIC, *INTERMED...
 Current library  . . . . . . . .   *CRTDFT       Name, *CRTDFT
 Initial program to call  . . . . > XSEUCLP       Name, *NONE
   Library  . . . . . . . . . . . >   XAOBJ        Name, *LIBL, *CURLIB
 Initial menu . . . . . . . . . .   MAIN          Name, *SIGNOFF
   Library  . . . . . . . . . . .     *LIBL       Name, *LIBL, *CURLIB
 Limit capabilities . . . . . . .   *NO           *NO, *PARTIAL, *YES
 Text 'description' . . . . . . . > 'X-Analysis - SEU User'

                                                                      More...
F3=Exit    F4=Prompt    F5=Refresh    F12=Cancel    F13=How to use this display
F24=More keys
```

Press **F10** and Page Down

Set Special Authorities:

- ***ALLOBJ**
- ***JOBCTL**
- ***SAVSYS**

```
                    Change User Profile (CHGUSRPRF)

Type choices, press Enter.

                           Additional Parameters

Special authority  . . . . . .   *ALLOBJ       *SAME, *USRCLS, *NONE...
                                  *JOBCTL
                                  *SAVSYS
Special environment  . . . . . .  *SYSVAL       *SAME, *SYSVAL, *NONE, *S36
Display sign-on information  . .  *SYSVAL       *SAME, *NO, *YES, *SYSVAL
Password expiration interval . .  *SYSVAL       1-366, *SAME, *SYSVAL, *NOMAX
Limit device sessions  . . . . .  *SYSVAL       *SAME, *NO, *YES, *SYSVAL
Keyboard buffering . . . . . .    *SYSVAL       *SAME, *SYSVAL, *NO...
Maximum allowed storage  . . . .  *NOMAX         Kilobytes, *NOMAX
Highest schedule priority  . . .  3             0-9
Job description  . . . . . .     QDFTJOBD      Name
  Library  . . . . . .              QGPL        Name, *LIBL, *CURLIB
Group profile  . . . . . .        *NONE         Name, *NONE

                                                                    More...
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Step 3 Logoff.

CREATING MACRO OF XAN4SEU

Macros allow you to automatically sign on for XAN4SEU, and seamlessly work with the **SEU** option. So, it is necessary to verify whether the XAN4SEU macro has been created. If not, then record this macro using the following steps:

Step 1: Press the **Start Recording** button. The **Record Macro/Script as** dialog will be displayed. Sign on with the **XAN4SEU** user profile.

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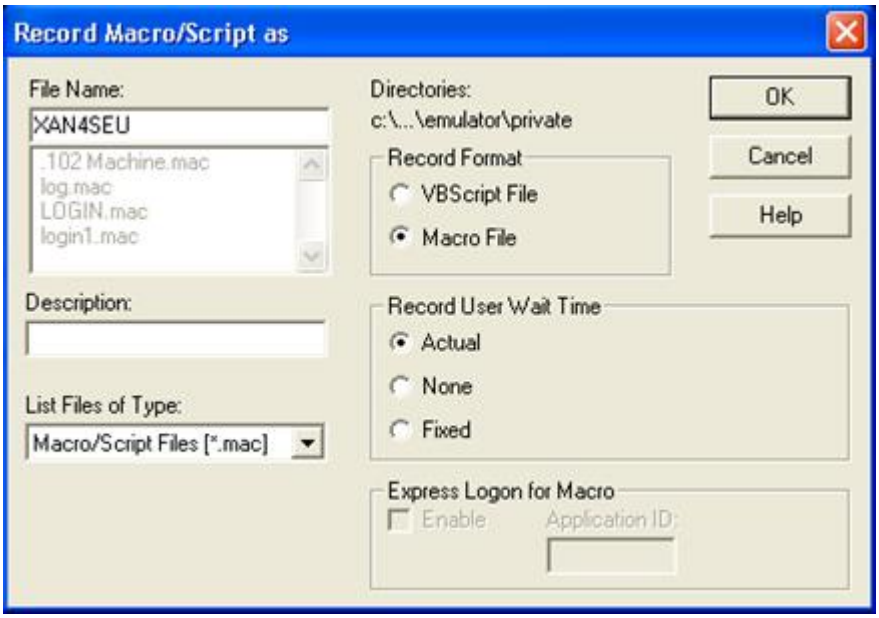
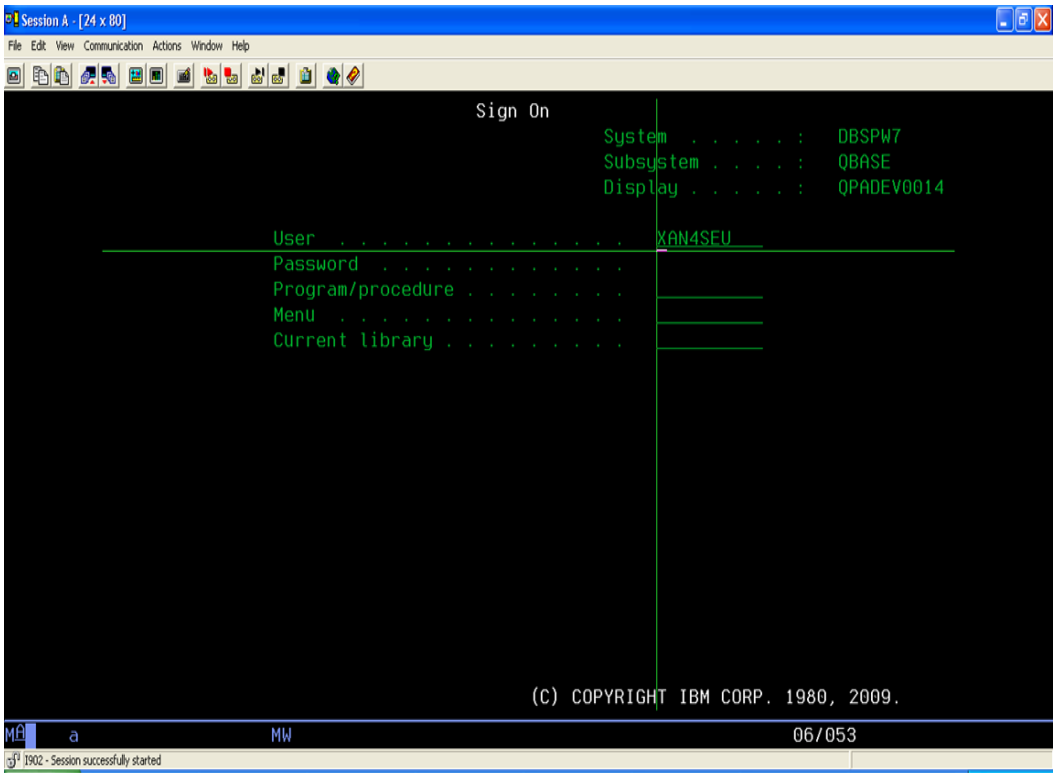
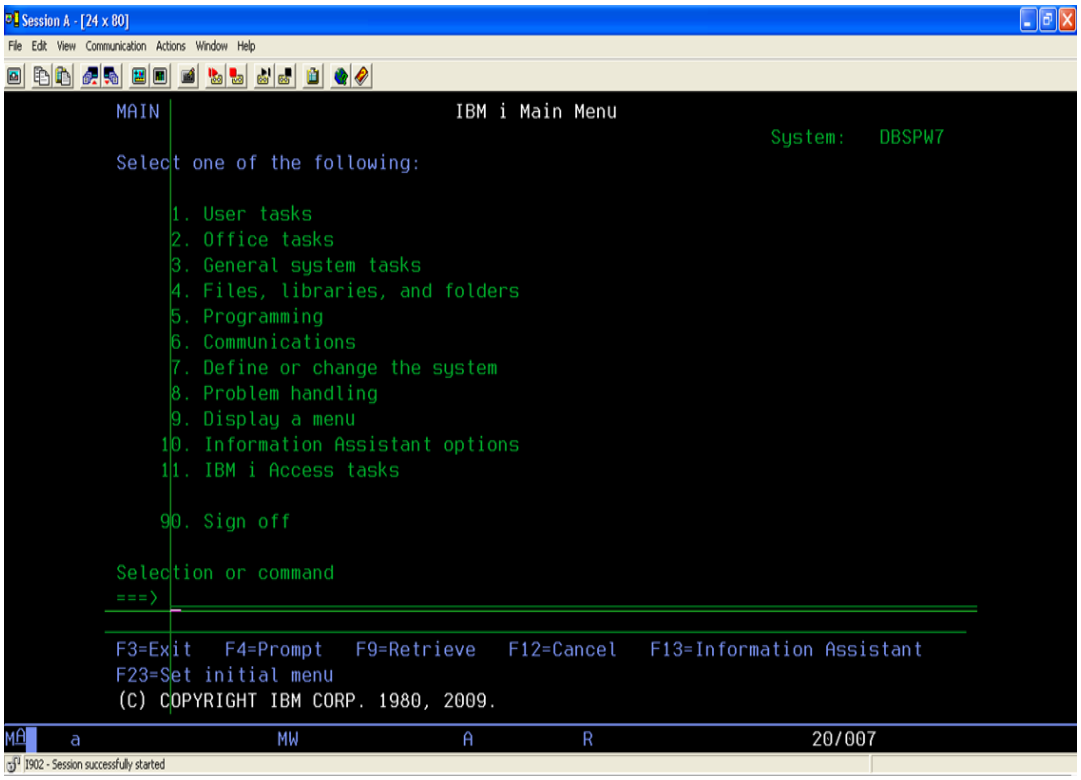


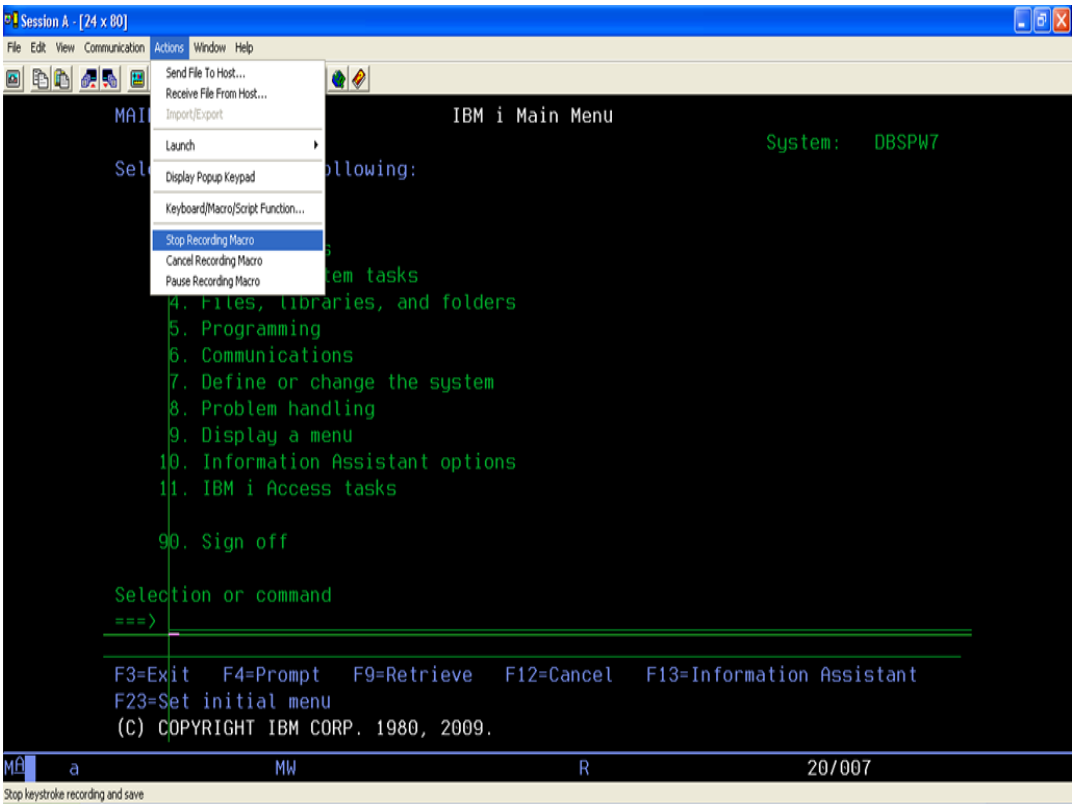
Step 2: On the Sign On screen, enter the User Profile – **XAN4SEU**. Press **Tab** and enter the Password also as **XAN4SEU**.


Session A - [24 x 80]
File Edit View Communication Actions Window Help
Sign On
System . . . . . : DBSPW7
Subsystem . . . . : QBASE
Display . . . . . : QPADEV0014
User XAN4SEU
Password . . . . . .
Program/procedure . . . . . .
Menu . . . . . .
Current library . . . . . .
(C) COPYRIGHT IBM CORP. 1980, 2009.
MA a MW 06/053
I902 - Session successfully started

Press **ENTER**. The IBM i main menu screen will be displayed:


Session A - [24 x 80]
File Edit View Communication Actions Window Help
MAIN
IBM i Main Menu
System: DBSPW7
Select one of the following:
1. User tasks
2. Office tasks
3. General system tasks
4. Files, libraries, and folders
5. Programming
6. Communications
7. Define or change the system
8. Problem handling
9. Display a menu
10. Information Assistant options
11. IBM i Access tasks
90. Sign off
Selection or command
===>
F3=Exit F4=Prompt F9=Retrieve F12=Cancel F13=Information Assistant
F23=Set initial menu
(C) COPYRIGHT IBM CORP. 1980, 2009.
MA a MW A R 20/007
I902 - Session successfully started

Step 3: Stop the recording by selecting the **Stop Recording Macro** option from the **Actions** submenu or clicking the related button directly from the toolbar.


Session A - [24 x 80]
File Edit View Communication Actions Window Help
Send File To Host...
Receive File From Host...
Import/Export
Launch
Display Popup Keypad
Keyboard/Macro/Script Function...
Stop Recording Macro
Cancel Recording Macro
Pause Recording Macro
IBM i Main Menu
System: DBSPW7
4. Files, libraries, and folders
5. Programming
6. Communications
7. Define or change the system
8. Problem handling
9. Display a menu
10. Information Assistant options
11. IBM i Access tasks
90. Sign off
Selection or command
===>
F3=Exit F4=Prompt F9=Retrieve F12=Cancel F13=Information Assistant
F23=Set initial menu
(C) COPYRIGHT IBM CORP. 1980, 2009.
a MW R 20/007
Stop keystroke recording and save

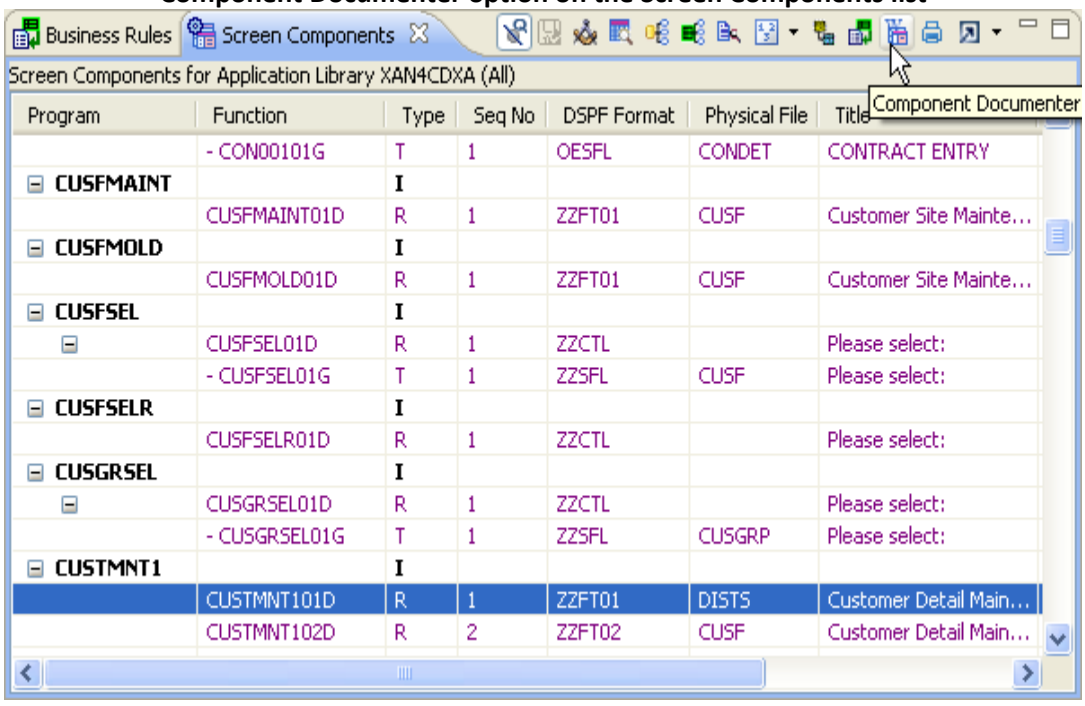
Appendix C – Component Documenter

The **Component Documenter** option documents the extracted Screen Components (Re-engineered Functions). The option is available on the toolbar of Screen Components, Data Content Diagram, and Screen Action Diagram. The System document is generated for the selected Screen Component.

WORK WITH COMPONENT DOCUMENTER

Expand the X-Analysis application library (cross-reference library), and then double-click the **Screen Components** node. This invokes the Screen Components list. Select the screen component for which component documentation is to be done, and then click the **Component Documenter** icon as shown below:

Component Documenter option on the Screen Components list


Business Rules
Screen Components
Screen Components for Application Library XAN4CDXA (All)
Component Documenter
Program
Function
Type
Seq No
DSPF Format
Physical File
Title
- CON00101G T 1 OESFL CONDET CONTRACT ENTRY
CUSFMAINT I
CUSFMAINT01D R 1 ZZFT01 CUSF Customer Site Mainte...
CUSFMOLD I
CUSFMOLD01D R 1 ZZFT01 CUSF Customer Site Mainte...
CUSFSEL I
CUSFSEL01D R 1 ZZCTL Please select:
- CUSFSEL01G T 1 ZZSFL CUSF Please select:
CUSFSELR I
CUSFSELR01D R 1 ZZCTL Please select:
CUSGRSEL I
CUSGRSEL01D R 1 ZZCTL Please select:
- CUSGRSEL01G T 1 ZZSFL CUSGRP Please select:
CUSTMNT1 I
CUSTMNT101D R 1 ZZFT01 DISTS Customer Detail Main...
CUSTMNT102D R 2 ZZFT02 CUSF Customer Detail Main...

Note: Multiple selections of Screen Components are allowed for Component Documentation.

Click the **Component Documenter** icon to display the System Documenter Wizard, as shown below:

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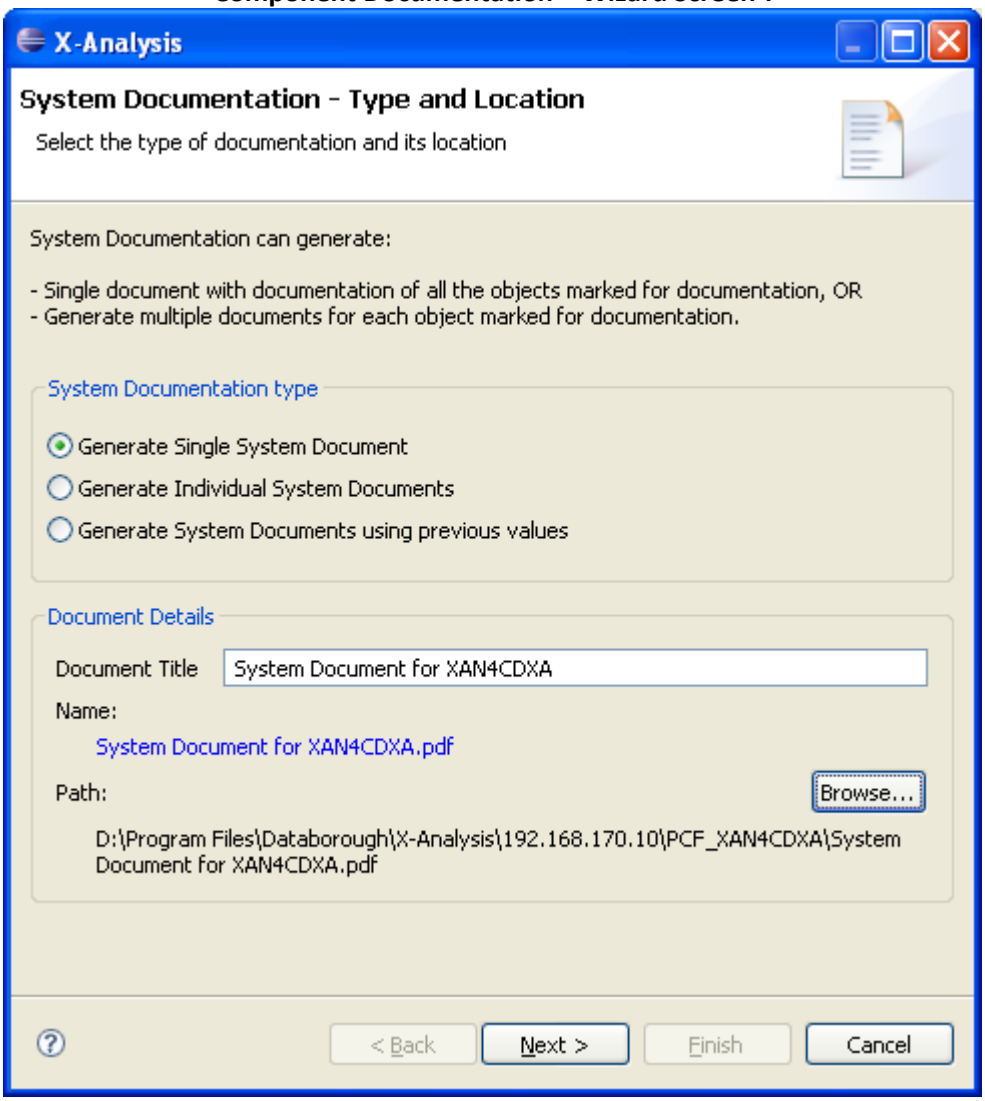
Component Documentation – Wizard Screen-I


X-Analysis
System Documentation - Type and Location
Select the type of documentation and its location
System Documentation can generate:
- Single document with documentation of all the objects marked for documentation, OR
- Generate multiple documents for each object marked for documentation.
System Documentation type
Generate Single System Document
Generate Individual System Documents
Generate System Documents using previous values
Document Details
Document Title
System Document for XAN4CDXA
Name:
System Document for XAN4CDXA.pdf
Path:
Browse...
D:\Program Files\Databorough\X-Analysis\192.168.170.10\PCF_XAN4CDXA\System Document for XAN4CDXA.pdf
< Back
Next >
Finish
Cancel

Document Wizard Sections

System Documentation type

The following options are available for System Documentation type:

- **Generate Single System Document** – This is the default option. It means that a single system document will be generated for all the selected objects.
- **Generate Individual System Documents** – It means that individual system documents will be generated for all the selected objects.
- **Generate System Documents using previous values** – X-Analysis provides a unique feature of recalling the previous options selected by the user in System Documentation process. Through the **Generate System Documents using previous**

values option the user is able to generate a System Document without choosing the same options again in System Documentation process.

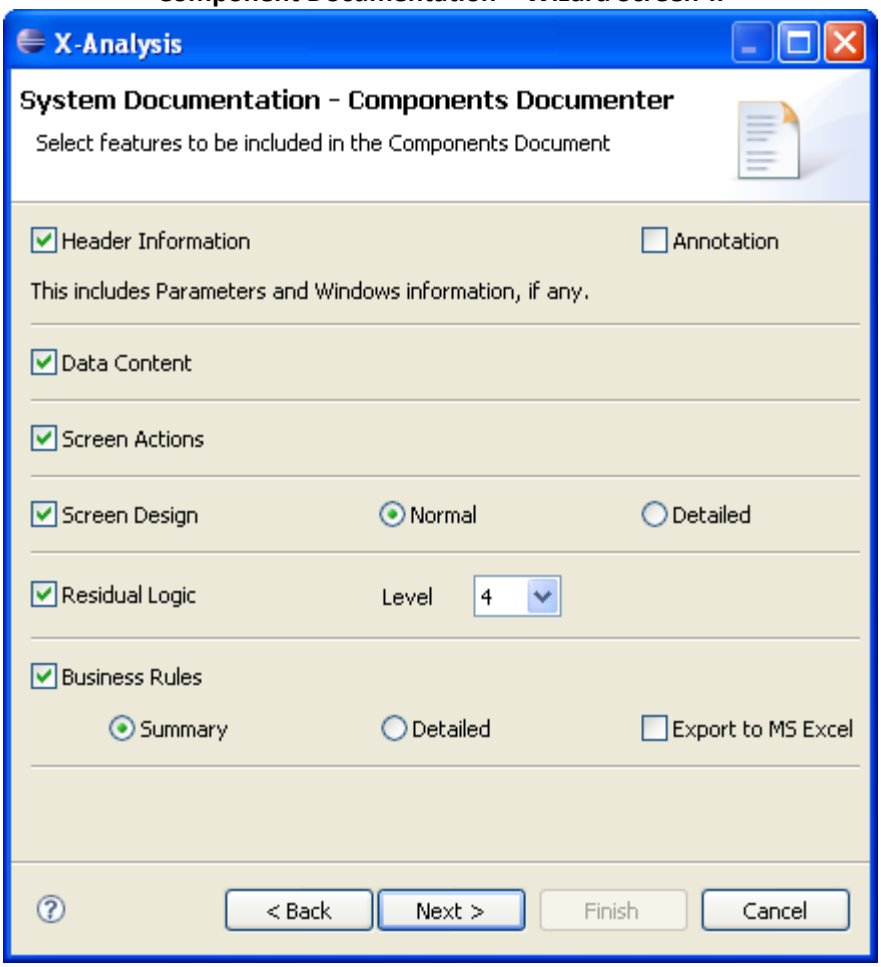
Document Details

Document Title – The user can change document title as per the requirement.

Path – Click the **Browse** button to change the default path.

After making appropriate selections, click **Next** which displays the following screen:

Component Documentation – Wizard Screen-II



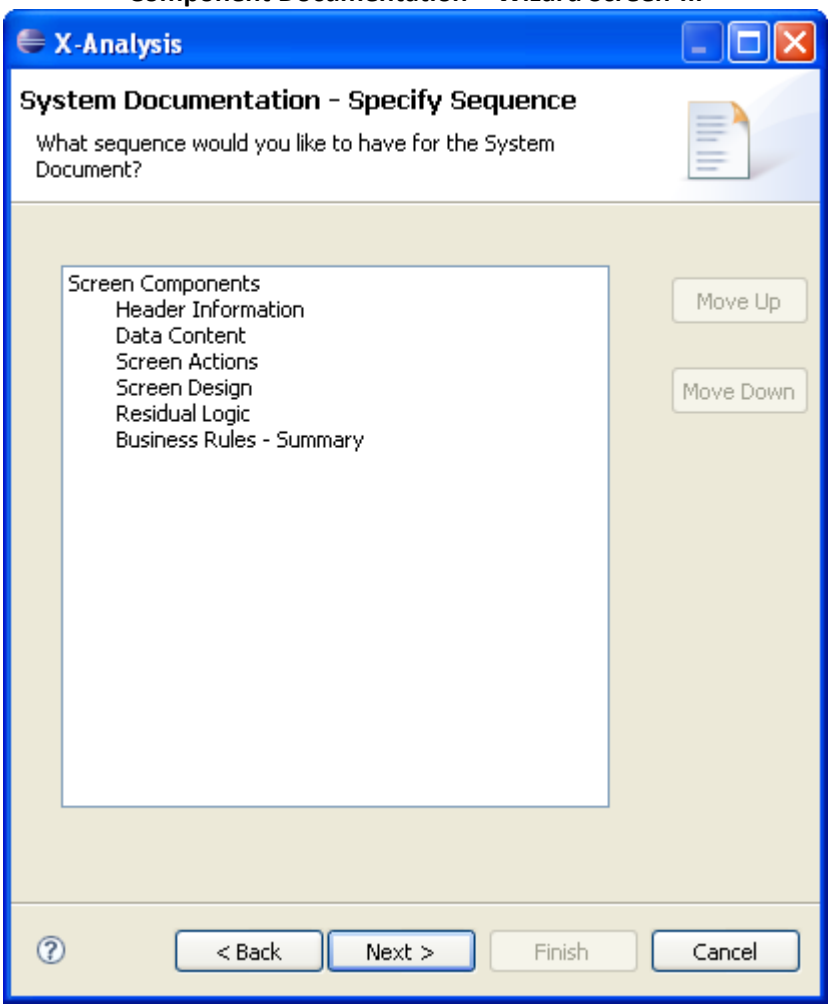
The user can select various options as per requirement from the Wizard Screen-II. The options available are:

- Header Information – This prints the function header information from the screen design. It also prints the parameters and windows information for the selected screen component.
- Data Content – This prints the data content diagram for the selected screen component.

- Screen Actions – This prints the screen action diagram for the selected screen component.
- Screen Design (Re-engineered Screen) – This prints the screen design (re-engineered screen) for the selected screen component. It has got two sub-options, Normal and Detailed. The default option is **Normal**. When the **Detailed** option is selected then the Field Details for the associated screen formats are also printed.
- Residual Logic – This prints the business process logic for the re-engineered screen.
- Business Rules – This prints the business rules for the selected screen.

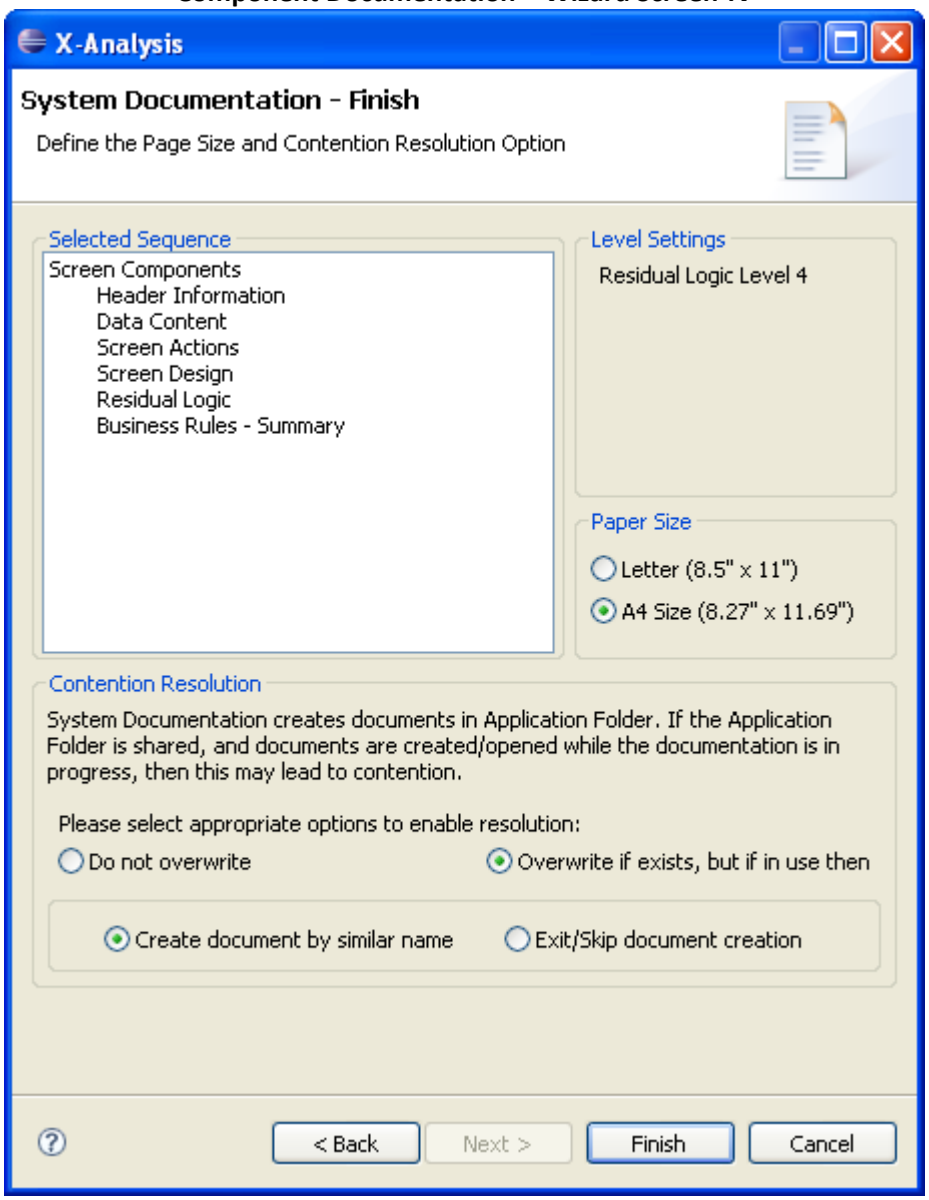
After making the appropriate selections, click **Next** which displays the following screen:

Component Documentation – Wizard Screen-III



Click **Next** which displays the following screen:

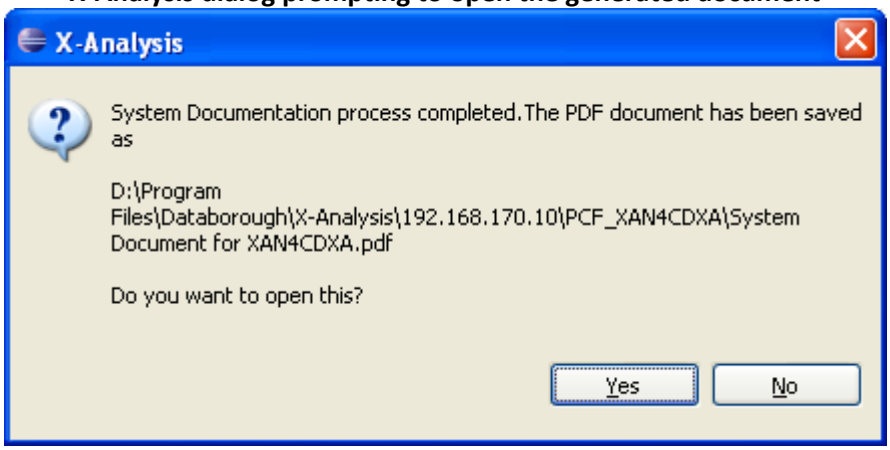
Component Documentation – Wizard Screen-IV


X-Analysis
System Documentation - Finish
Define the Page Size and Contention Resolution Option
Selected Sequence
Screen Components
Header Information
Data Content
Screen Actions
Screen Design
Residual Logic
Business Rules - Summary
Level Settings
Residual Logic Level 4
Paper Size
Letter (8.5" x 11")
A4 Size (8.27" x 11.69")
Contention Resolution
System Documentation creates documents in Application Folder. If the Application Folder is shared, and documents are created/opened while the documentation is in progress, then this may lead to contention.
Please select appropriate options to enable resolution:
Do not overwrite
Overwrite if exists, but if in use then
Create document by similar name
Exit/Skip document creation
< Back
Next >
Finish
Cancel

Here, you can see all selections that he has made and can also define various options related to document formatting like 'Paper Size' and 'Contention Resolution'.

Click **Finish** to generate the document. The Progress status is displayed on screen while generating the system document. The document will be located in the specified save location. After the documentation process is over, the following screen is displayed by X-Analysis to open the generated document:

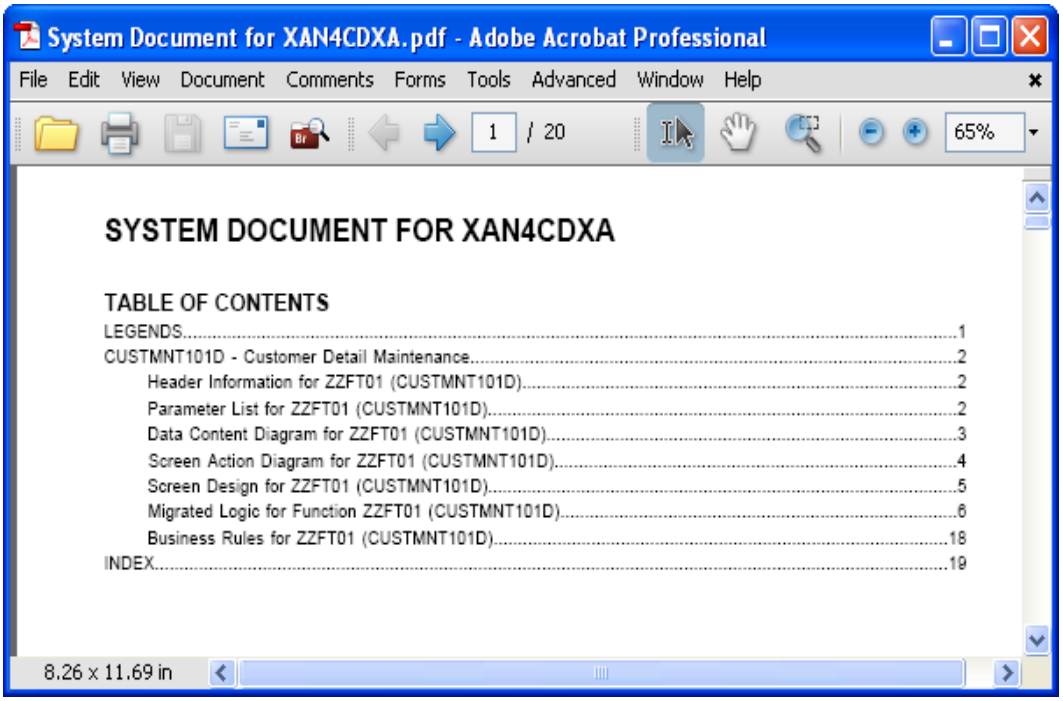
X-Analysis dialog prompting to open the generated document


X-Analysis
System Documentation process completed.The PDF document has been saved as
D:\Program Files\Databorough\X-Analysis\192.168.170.10\PCF_XAN4CDXA\System Document for XAN4CDXA.pdf
Do you want to open this?
Yes
No

Viewing the Generated Document

The following screens display the generated document:

Table of Contents


System Document for XAN4CDXA.pdf - Adobe Acrobat Professional
File Edit View Document Comments Forms Tools Advanced Window Help
1 / 20
65%
SYSTEM DOCUMENT FOR XAN4CDXA
TABLE OF CONTENTS
LEGENDS....1
CUSTMNT101D - Customer Detail Maintenance....2
Header Information for ZZFT01 (CUSTMNT101D)....2
Parameter List for ZZFT01 (CUSTMNT101D)....2
Data Content Diagram for ZZFT01 (CUSTMNT101D)....3
Screen Action Diagram for ZZFT01 (CUSTMNT101D)....4
Screen Design for ZZFT01 (CUSTMNT101D)....5
Migrated Logic for Function ZZFT01 (CUSTMNT101D)....6
Business Rules for ZZFT01 (CUSTMNT101D)....18
INDEX....19
8.26 x 11.69 in

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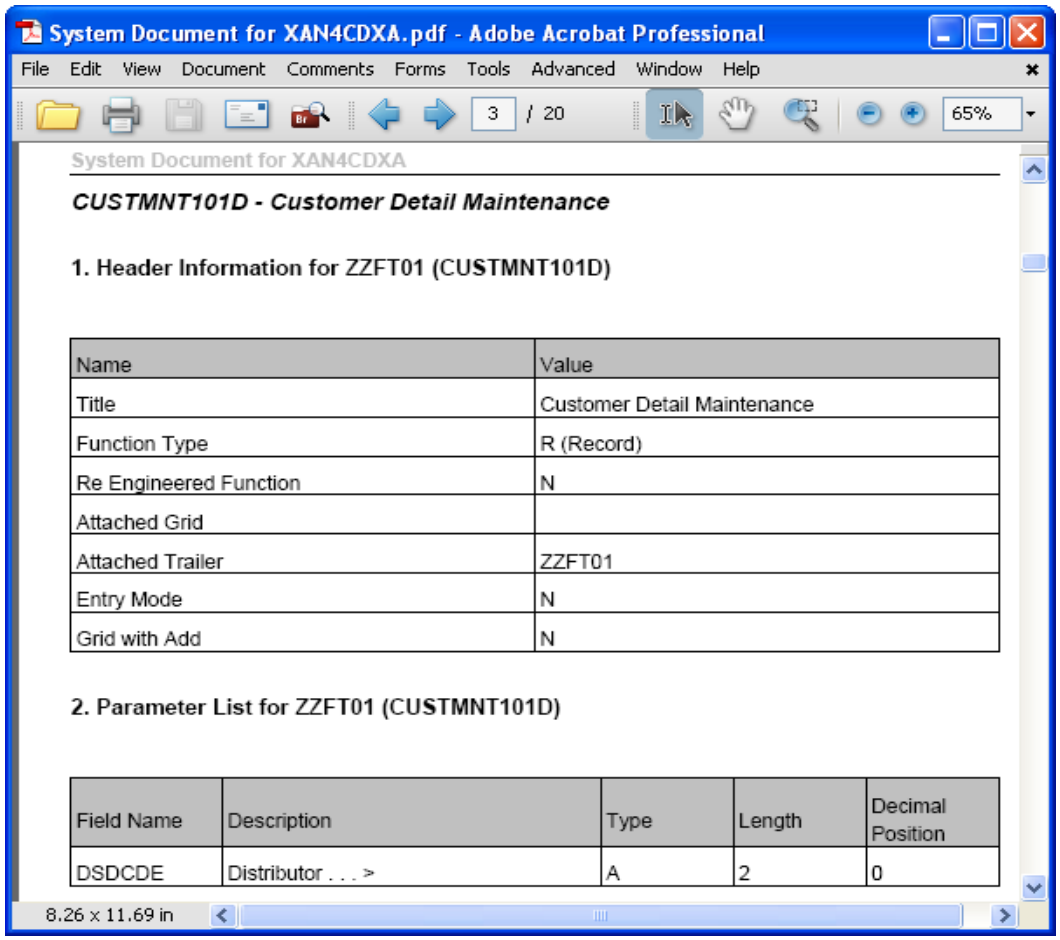
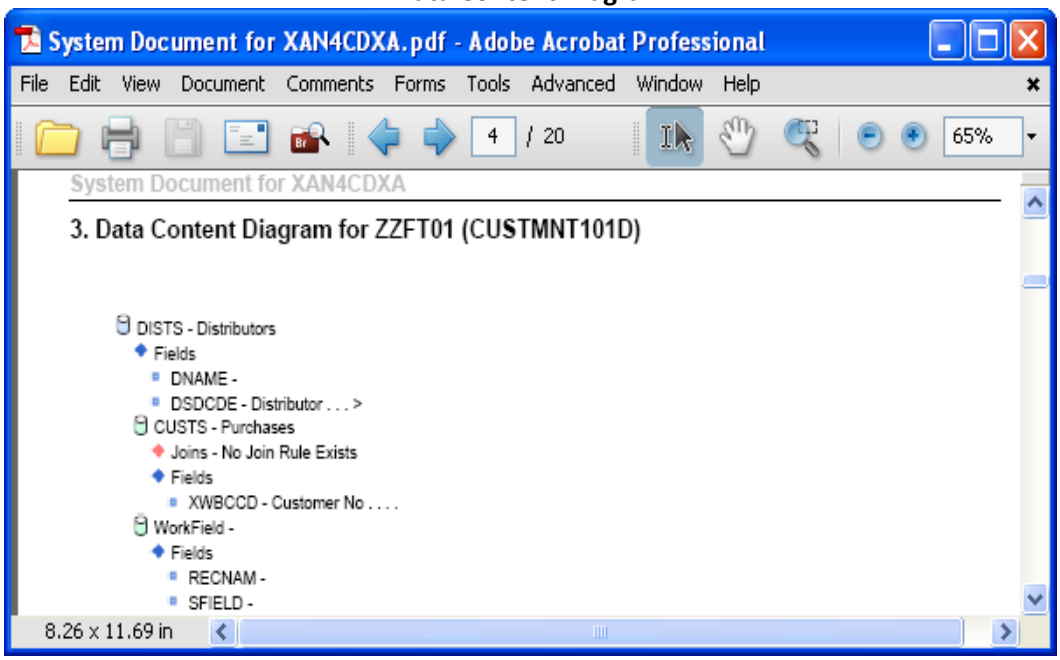
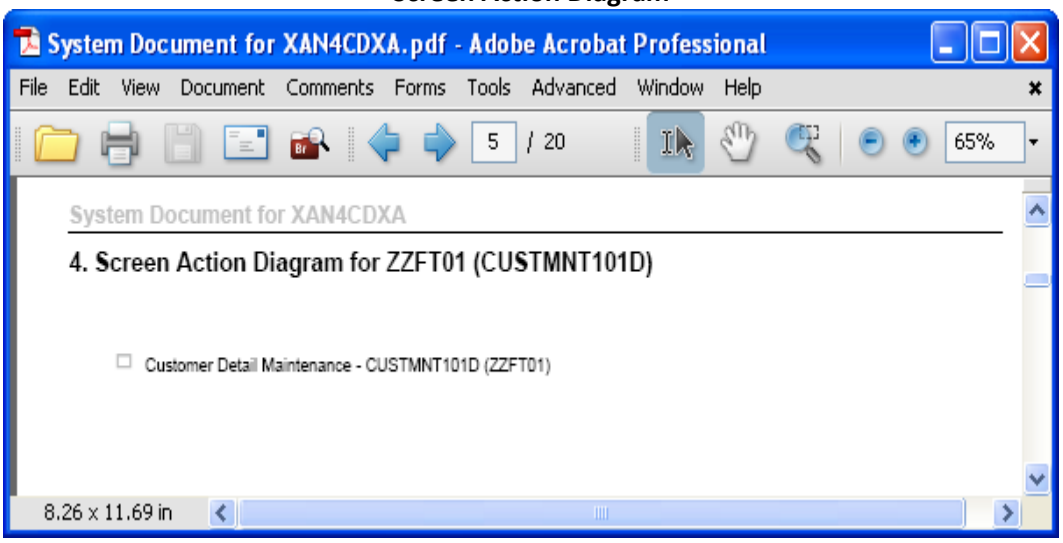
Header & Parameter information



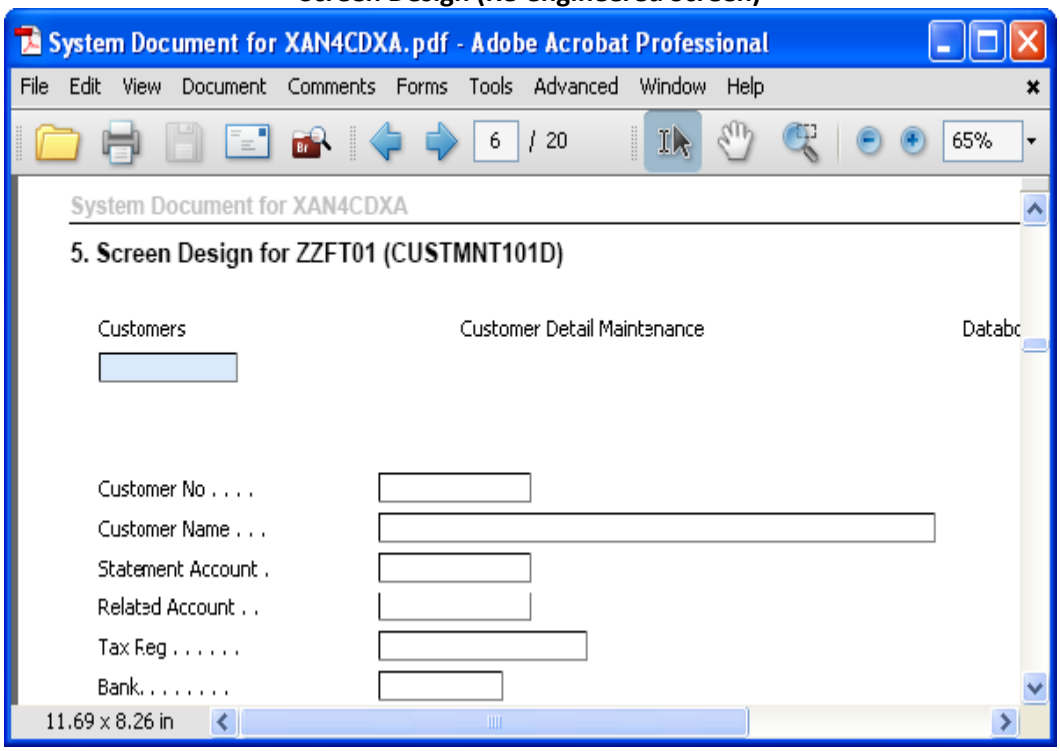
Data Content Diagram



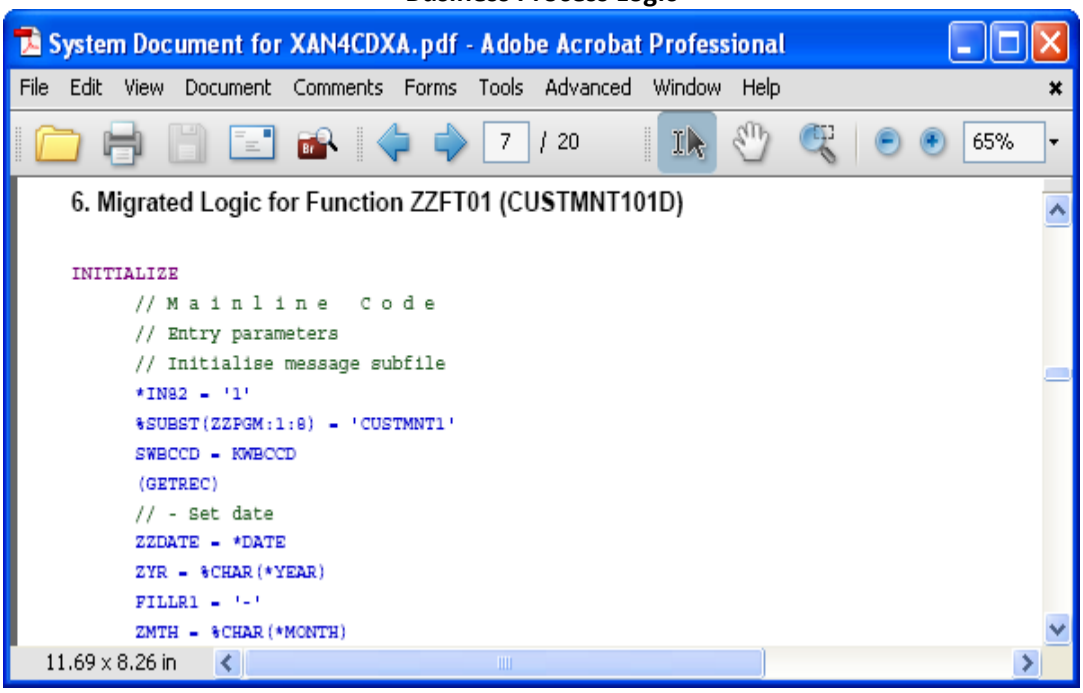
Screen Action Diagram


System Document for XAN4CDXA.pdf - Adobe Acrobat Professional
File Edit View Document Comments Forms Tools Advanced Window Help
5 / 20
65%
System Document for XAN4CDXA
4. Screen Action Diagram for ZZFT01 (CUSTMNT101D)
Customer Detail Maintenance - CUSTMNT101D (ZZFT01)
8.26 x 11.69 in

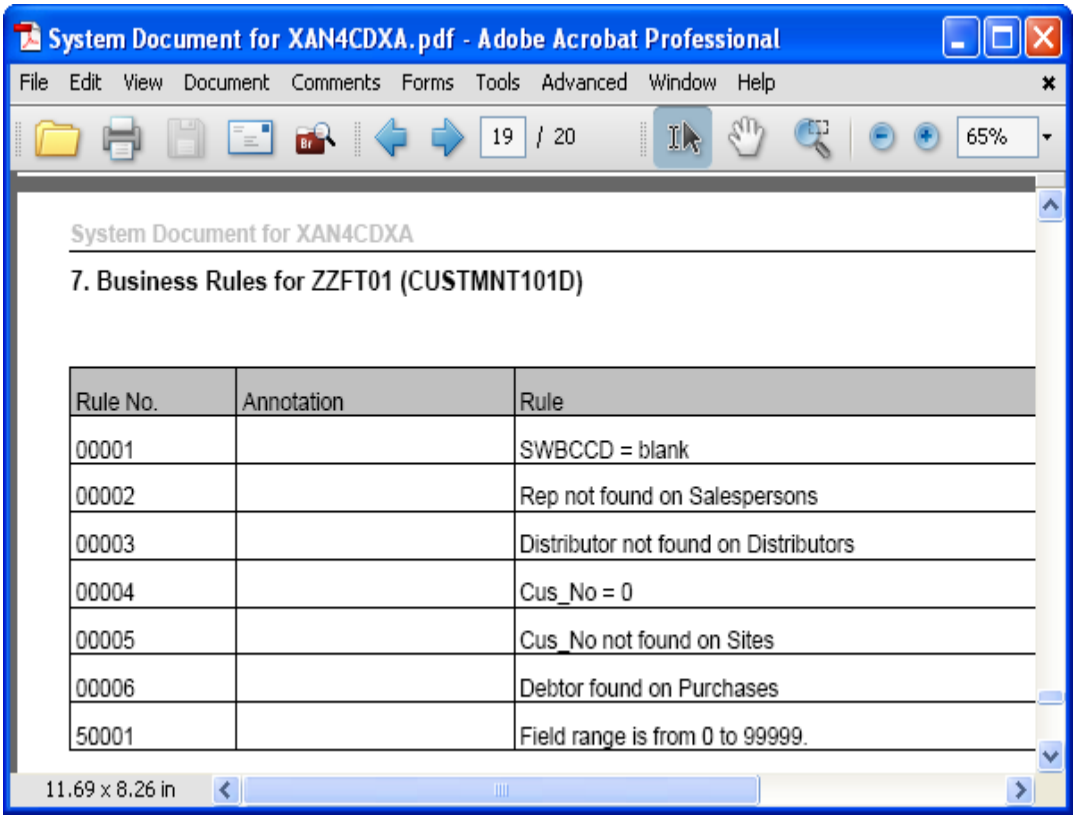
Screen Design (Re-engineered Screen)


System Document for XAN4CDXA.pdf - Adobe Acrobat Professional
File Edit View Document Comments Forms Tools Advanced Window Help
6 / 20
65%
System Document for XAN4CDXA
5. Screen Design for ZZFT01 (CUSTMNT101D)
Customers
Customer Detail Maintenance
Customer No . . . .
Customer Name . . .
Statement Account .
Related Account . .
Tax Reg . . . . . .
Bank. . . . . .
11.69 x 8.26 in

Business Process Logic



Business Rules


System Document for XAN4CDXA.pdf - Adobe Acrobat Professional
File Edit View Document Comments Forms Tools Advanced Window Help
19 / 20
65%
System Document for XAN4CDXA
7. Business Rules for ZZFT01 (CUSTMNT101D)
Rule No. Annotation Rule
00001 SWBCCD = blank
00002 Rep not found on Salespersons
00003 Distributor not found on Distributors
00004 Cus_No = 0
00005 Cus_No not found on Sites
00006 Debtor found on Purchases
50001 Field range is from 0 to 99999.
11.69 x 8.26 in

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Appendix D – XREDOAPP Command

The **XREDOAPP** command is the master interface to control an X-REDO application. The Library List needs to be set correctly before using this master command.

SET THE LIBRARY LIST

Change the Library List to ensure the following sequence:

- **XAOBJ**
- **QGPL**
- **QTEMP**

Use the **EDTLIBL** command to set the library list.

EDTLIBL command screen

```
                            Edit Library List
                                                          System:   DBSPW6
Type new/changed information, press Enter.

Sequence                    Sequence                    Sequence
 Number   Library           Number   Library           Number   Library
     0                        150                         300
    10    XAOBJ              160                         310
    20    QGPL               170                         320
    30    QTEMP              180                         330
    40                       190                         340
    50                       200                         350
    60                       210                         360
    70                       220                         370
    80                       230                         380
    90                       240                         390
   100                       250                         400
   110                       260                         410
   120                       270                         420
   130                       280                         430
   140                       290                         440
                                                                    More...
F3=Exit    F5=Refresh    F12=Cancel
```

After updating the Library List, type the **XREDOAPP** command and press **ENTER**. The following screen (similar) should appear:

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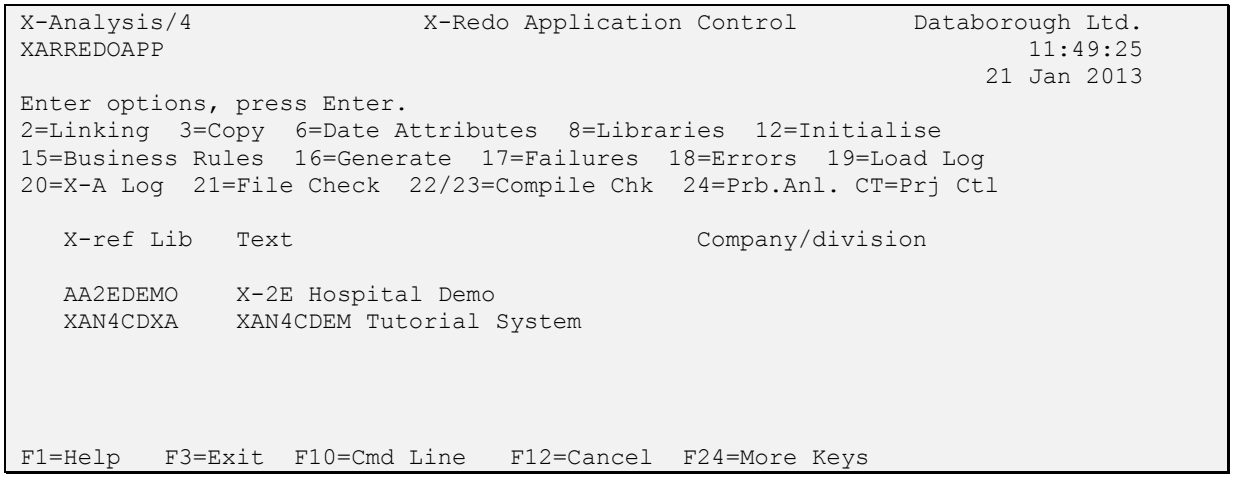
XREDOAPP Command screen


X-Analysis/4 X-Redo Application Control Databorough Ltd.
XARREDOAPP 11:49:25
21 Jan 2013
Enter options, press Enter.
2=Linking 3=Copy 6=Date Attributes 8=Libraries 12=Initialise
15=Business Rules 16=Generate 17=Failures 18=Errors 19=Load Log
20=X-A Log 21=File Check 22/23=Compile Chk 24=Prb.Anl. CT=Prj Ctl
X-ref Lib Text Company/division
AA2EDEMO X-2E Hospital Demo
XAN4CDXA XAN4CDEM Tutorial System
F1=Help F3=Exit F10=Cmd Line F12=Cancel F24=More Keys

OPTIONS AVAILABLE ON THE XREDOAPP COMMAND INTERFACE

The following options are available on the **XREDOAPP** command interface:

- Option 2 = Linking
- Option 3 = Copy
- Option 6 = Date Attributes
- Option 8 = Libraries
- Option 12 = Initialise
- Option 15 = Business Rules
- Option 16 = Generate
- Option 17 = Failures
- Option 18 = Errors
- Option 19 = Load Log
- Option 20 = X-A Log
- Option 21 = File Check
- Option 22 = Compile Check
- Option 24 = Prb. Anl.
- Option CT = Prj Ctl

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Option 2 = Linking

Option 2 can be used to link multiple applications. To use the **Linking** option some Data Areas need to be updated. The following screen displays the 'Linking' window:

LINKING option – Work with Data Areas

```
X-Analysis                  Work with Data Areas             Databorough Ltd.
XARWKDARAS                                                           11:49:25
                                                                   2013-01-21

Enter options, press Enter.
5=Work with values


   Data Area

   XS2ELKPRJ: Linked Project
   XS2EMNPRJ: Main Project
   XS2EPXLIB: Program Object Exclusion Library







F3=Exit, F12=Cancel
```

Linked Project

To display/edit the 'Linked Project' Data Area, use **Option 5** against it. The following similar window appears:

Work with Data Areas – Linked Project

```
  X-Analysis         Work with Data Area Values                Databorough Ltd.
XARWKDARAS                                                           11:49:25
                                                                   2013-01-21

Enter options, press Enter.
2=Change value


   Description                                    Current Value

   Linked Project Library Name
```

Use **Option 2** to change the value of the Data Area – Linked Project.

Change value of Data Areas – Linked Project

```
X-Analysis                 Change Data Area Value             Databorough Ltd.
XARWKDARAS                                                           11:49:25
                                                                   2013-01-21

 Linked Project Library Name
```

Main Project

To display/edit the 'Main Project' Data Area, use **Option 5** against it. The following similar window appears:

Work with Data Areas – Main Project

```
X-Analysis         Work with Data Area Values                Databorough Ltd.
XARWKDARAS                                                           11:50:15
                                                                  2013-01-21
Enter options, press Enter.
2=Change value


   Description                                        Current Value

   Main Project Library Name
```

Use **Option 2** to change the value of the Data Area – Main Project.

Change Value of Data Areas – Main Project

```
X-Analysis                Change Data Area Value             Databorough Ltd.
XARWKDARAS                                                           11:50:27
                                                                  2013-01-21
 Main Project Library Name
```

Program Object Exclusion Library

This X-2E feature allows the user to exclude the programs from reengineering them when the program objects are in the specified library. This feature is directly controlled by **XS2EPXLIB** data area. If the user wants to exclude the programs from a particular library then that library name can be specified in the **XS2EPXLIB** data area. The default value is blank.

To display/edit the 'Program Object Exclusion Library' Data Area, use **Option 5** against it. The following similar window appears:

Work with Data Areas – Program Object Exclusion Library

```
X-Analysis         Work with Data Area Values                Databorough Ltd.
XARWKDARAS                                                           11:50:27
                                                                  2013-01-21
Enter options, press Enter.
2=Change value


   Description                                        Current Value

   Program Object Exclusion Library
```

Use **Option 2** to change the value of the Data Area – Program Object Exclusion Library.

Change Value of Data Areas – Program Object Exclusion Library

```
X-Analysis                 Change Data Area Value            Databorough Ltd.
XARWKDARAS                                                          11:50:27
                                                                  2013-01-21
Program Object Exclusion Library
```

Option 3 = Copy

Option 3 copies the X-REDO Application Control settings to a new library. The following screen displays the 'Copy' window:

Screen displaying Copy option

```
X-Analysis/4                X-Redo Application Control        Databorough Ltd.
XARREDOAPP                                                          11:51:11
                                                                 21 Jan 2013
 X-ref Library. . . . . . . . .
 Text . . . . . . . . . . . . .    X-2E Hospital Demo
 Company/division . . . . . . .
 Index src files. . . . . . . .    Y
 Process var & bound calls. . .    Y
 Include obsolete source  . . .
 Build data model . . . . . . .
 Data model match value   . . .
 TCPIP address  . . . . . . . .
 User iD  . . . . . . . . . . .




F1=Help        F3=Exit        F12=Cancel
```

Option 6 = Date Attributes

Option 6 can be used to change the SYNON shipped date types. The following screen displays the 'Date Attributes' window:

Change Date Attributes

```
WORK WITH DATA IN A FILE                        Mode . . . . :   CHANGE
Format . . . . :   XS2EDTATRF                   File . . . . :   XS2EDTATR

S2DTATR:









F3=Exit                 F5=Refresh               F6=Select format
```

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```
F9=Insert              F10=Entry              F11=Change
```

Option 8 = Libraries

Option 8 can be used to set up library list for the X-REDO application. The following screen displays the 'Libraries' window:

Libraries screen

```
X-Analysis/4   Work with X-Analysis/4 Application Libraries   Databorough Ltd.
XARWKLIB                                                            11:51:11
                                                                  21 Jan 2013
Selected x-ref Library -> :   AA2EDEMO

Enter options, press Enter.
2=Change    4=Delete    5=Display

   Type Sequence Library

   S       .00   X2EGEN
   O       .00   X2EGEN
   M       .00   X2EMDL









F1=Help        F3=Exit        F6=Add         F12=Cancel     F16=Print
```

The **F6** function key can be used to add new library as shown below:

Add New Libraries screen

```
X-Analysis/4   Work with X-Analysis/4 Application Libraries   Databorough Ltd.
XARWKLIB                                                            11:51:11
                                                                  21 Jan 2013
 X-ref library.     AA2EDEMO
 Type . . . . .     M          (O=Object,S=Source,M=2E Model)
 Sequence . . .        .00
 Library. . . .
```

This screen is used to set up the source, object and model libraries for the selected application. If you intend to build the data model using CA 2E model libraries, then you should enter the names of those libraries here, specifying the library type as "M".

These libraries are used when initializing the application and for various other commands which need this information.

The maximum number of libraries allowed for each type is 300.

Two items of data are held against each library name:

Library type – O - Object, S - Source or M - 2E Model type of libraries

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Sequence Number – It determines the order in which the libraries are placed in the library list.

Option 12 = Initialise

Option 12 can be used to initialise the X-REDO Application Library. The following screen displays the 'Initialise' window:

Initialise screen

```
                      Initialise X-Analysis/4 (XAXREF)

Type choices, press Enter.

X-Analysis Library . . . . . > AA2EDEMO      Name
Object Libraries . . . . . .   *SPECIFIED    Name, *SPECIFIED
               + for more values
Source Libraries . . . . . .   *SPECIFIED    Name, *SPECIFIED, *NONE
               + for more values
Index Source Files . . . . . > *ALL          *CHG, *NO, *ALL, *UPG
Build Data Model . . . . . . > *YES          *YES, *NO
Generate Business Rules  . . . > *YES        *YES, *NO
Initialise X-Resize  . . . . .   *NO          *YES, *NO
Include obsolete source/object   *NO          *YES, *NO
Import 2E Model  . . . . . . . > *MODEL      *CODE, *MODEL









                                                                    Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Option 15 = Business Rules

Option 15 can be used to generate Business Rules for a single application area, or for the entire application. The following screen displays the Business Rules window:

Generate Business Rules screen

```
                   Generate Business Rules (XGENBRULES)

Type choices, press Enter.

X-Analysis X-Ref Library . . . . > AA2EDEMO      Name
X-Rev Library  . . . . . . . . .   *XALIB        Name, *XALIB
X-Analysis Application Area  . .   *ALL          Character value, *ALL, *PGM









                                                                    Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

This command will identify the business rules logic in each program in the application over which the specified X-Analysis cross-reference database has been built.

A source member containing the business rule logic and narrative describing each rule is generated for each program.

Option 16 = Generate

Option 16 can be used to generate the new RPGLE application programs. The following screen displays the 'Generate' window:

GENERATE screen

```
                      Re-engineer Programs (XREGENP)

Type choices, press Enter.

Program Name . . . . . . . . . .   *AREA         Name, *AREA, *ALL
X-Analysis Library . . . . . . . > AA2EDEMO      Name
New Pgm Suffix . . . . . . . . .   R             Character value
Restructure Interactive Pgms . .   *YES          *YES, *NO
Compile the Re-engineered Pgms     *YES          *YES, *NO




                                                                  Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Option 17 = Failures

Option 17 can be used to list program failure from the 'Generate' (**Option 16**) job. The following screen displays the 'Failures' window:

Failures Report

```
                            Display Report
                                        Report width . . . . . :      84
Position to line  . . . . .             Shift to column  . . . . . .
Line   ....+....1....+....2....+....3....+....4....+....5....+....6....+....7..
       X2RDAT      X2RTIM    X2ROBJ      X2RERR
000001 2011-07-29  09.14.14  A1002498    File Y2CFGTL0 is missing.
000002 2011-07-29  09.14.14  A1002498    Failed to compile.
000003 2011-07-29  09.14.14  A1002499    File Y2CFGTL0 is missing.
000004 2011-07-29  09.14.14  A1002499    Failed to compile.
000005 2011-07-29  09.14.14  A1002500    File Y2CFGTL0 is missing.
000006 2011-07-29  09.14.14  A1002500    Failed to compile.
000007 2011-07-29  09.14.14  A1002503    File Y2DSTFL0 is missing.
000008 2011-07-29  09.14.14  A1002503    Failed to compile.
000009 2011-07-29  09.14.14  A1002504    File Y2DSTFL0 is missing.
000010 2011-07-29  09.14.14  A1002504    Failed to compile.
000011 2011-07-29  09.14.14  A1002505    File Y2DSTFL0 is missing.
000012 2011-07-29  09.14.15  A1002505    Failed to compile.
000013 2011-07-29  09.14.15  A1002527    File Y2CFGTL1 is missing.
000014 2011-07-29  09.14.15  A1002527    Failed to compile.
000015 2011-07-29  09.14.15  A1002528    File Y2CFGTL1 is missing.
000016 2011-07-29  09.14.15  A1002528    Failed to compile.
                                                              More...
F3=Exit      F12=Cancel      F19=Left      F20=Right      F21=Split
```

Option 18 = Errors

Option 18 can be used to list compile time errors for program failures from the 'Generate' (**Option 16**) job. The following screen displays the 'Errors' window:

Errors Report

```
                              Display Report
                                          Report width . . . . . :     350
Position to line  . . . . .             Shift to column  . . . . . .
Line   ....+....1....+....2....+....3....+....4....+....5....+....6....+....7..
       Source      Source      Source      Compiler    Compile     Compile   Ob
       Library     File        Member      Command     Date        Time




****** ********  End of report  ********
```

Option 19 = Load Log

Option 19 can be used to display any notifiable errors encountered in any of the Generate processes. The following screen displays the 'Load Log' window:

Load Log Report screen

```
                         Display Physical File Member
File . . . . . :   XS2ELDLOG           Library  . . . . :   AA2EDEMO
Member . . . . :   XS2ELDLOG           Record . . . . . :   3
Control  . . . .                       Column . . . . . :   1
Find . . . . . .
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...
A1002920  Q2ESRC2   AA2EDEMO  XRRVY2EEPDY2DLSHL0  Missing access path for entr
                        ****** END OF DATA ******









                                                                       Bottom
F3=Exit   F12=Cancel   F19=Left   F20=Right   F24=More keys
```

Option 20 = X-Analysis Log

Option 20 can be used to display an audit of X-Analysis and Generate processes. The following screen displays the 'X-Analysis Log' window:

X-Analysis Log Report screen

```
                         Display Physical File Member
File . . . . . :   XA4LOG              Library  . . . . :   AA2EDEMO
Member . . . . :   XA4LOG              Record . . . . . :   367
Control  . . . .   B                   Column . . . . . :   1
Find . . . . . .
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...
2012-08-1005.43.33AA2EDEMO  XREGEN    Program: TSAHSRR              MANOJK
2012-09-1212.00.48AA2EDEMO  XREGEN    Program: TSBMPFR              MANOJK
2012-09-1212.03.29AA2EDEMO  XREGEN    Program: TSBMPFR              MANOJK
```

```
2012-09-1212.04.02AA2EDEMO  XREGEN    Program: TSBMPFR              MANOJK
2012-09-1212.08.07AA2EDEMO  XREGEN    Program: TSBMPFR              MANOJK
2012-09-1212.51.06AA2EDEMO  XREGEN    Program: TSBMPFR              MANOJK
2012-09-1213.34.42AA2EDEMO  XREGEN    Program: TSBMPFR              MANOJK
2012-09-1213.35.36AA2EDEMO  XREGEN    Program: TSBMPFR              MANOJK
2012-09-2510.23.20AA2EDEMO  XA4INIT   Application Initialization    STUART
2012-09-2510.23.41AA2EDEMO  XDMODEL   *CA2E                         STUART
2012-09-2510.24.13AA2EDEMO  XREENGPGMS*ALL programs                 STUART
2012-09-2510.24.14AA2EDEMO  XGENBRULES*ALL programs                 STUART
2012-09-2510.39.20AA2EDEMO  XREGEN    *ALL programs                 STUART
2012-10-0312.58.16AA2EDEMO  XREGEN    *ALL programs                 TESTER
                          ****** END OF DATA ******
                                                                    Bottom
F3=Exit    F12=Cancel    F19=Left    F20=Right    F24=More keys
```

Option 21 = File Check

Option 21 submits the **XCMPDB2MDL** command to batch. This option identifies all the programs and identifies any missing display files, printer files, physical files and access paths files. It also identifies field errors. It can be run over the entire application or application areas. The file results can be found in X2EDBERR and all associated programs can be found in X2EDBEPG.

```
File Check Report                    Compare Database to Model (XCMPDB2MDL)

Type choices, press Enter.

X-Analysis X-Ref Library . . . . > AA2EDEMO      Name
X-Analysis Application Area  . .   *ALL          Character value, *ALL




                                                                    Bottom
F3=Exit    F4=Prompt    F5=Refresh    F12=Cancel    F13=How to use this display
F24=More keys
```

Option 22 = Compile Check

Option 22 submits **XGENORGOBJ** command to batch. This option compiles all the original programs in **QTEMP**. It can be run over the entire application or application areas. All failures are logged in **X2EGCMLOG** and the associated error records are logged in **X2ECPLLOGO**. In addition, any original programs which fail to compile are written to the exclusion file, **X2ERGNEXS**. The programs listed in the exclusion file are not generated as part of **Option 16**, **XREGENP**.

```
                    Generate Original Objects (XGENORGOBJ)

Type choices, press Enter.

X-Analysis X-Ref Library . . . . > AA2EDEMO      Name
X-Analysis Application Area  . .   *ALL          Character value, *ALL
```

```
                                                                        Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Option 24 = Prb. Anl.

Option 24 can be used to display problems associated with the application. The following screen is displayed when **Option 24** is selected:

Problem Analysis screen

```
                  Analyse Application Problems (XPRBANL)

Type choices, press Enter.

X-Analysis Library . . . . . > AACA2EDEMO    Name



                                                                        Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Press **ENTER** to submit a batch job which will execute the **XPRBANL** command in batch mode.

Option CT = Prj Ctl

Option CT can be used to work with X2E/RPG Project Control. The following screen is displayed when you select **Option CT**:

Problem Control screen

```
X2E/RPG            Work with X2E/RPG Project Control          Databorough Ltd.
XARWKPRJL       Project: AA2EDEMO    Ref'd Project: RF2EDEMO          11:55:12
                                                                   21 Jan 2013
 Type options, press Enter.
 2=Change  4=Delete  5=Display  7=Notes  8=Comp.Errors  9=Missing Files

              ----Issue----
pt Program    Type Category   Program Description                  Assig'd To
   TSAGEFR      E  DSPDTASFL  Edit Doctor                          LYNDAB
   TSAWEFR    * E  PMTERROR   Edit Medication                      LYNDAB
   TSAXE1R    * E  SCNDATE    EDTRCD Edit Diagnosis                LYNDAB
   TSAZETR    * E  TRNLOGIC   TRN Edit Prescriptions               LYNDAB



                                                                        Bottom
F1=Help  F3=Exit  F5=Refresh  F6=Add  F10=Drop/Fold  F12=Cancel  F20=Summary
F21=Project Notes  F22=File Errors
```

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Options under Project Control Screen

The flow of actions from the 'Work with X2E/RPG Project Control' screen is as follows:

Actions	Options
Report issue picked for a program	**F6** – Add / **Option 2** - Change
Delete reported issue for a program	**Option 4**
Display reported program details	**Option 5**
Notes	**Option 7**
Compilation Errors	**Option 8**
Missing Files	**Option 9**
Summary	**F20**
Project Notes	**F21**
File Errors	**F22**

F6 = Add

Enter the following information:

Note: Same applies to Option 2 – change the added issue.

Program Name
Enter the program's name for which the issue has to be reported.

Text
Enter suitable description for the issue.

Issue Type
Enter issue type.

Date and Time of event
This is a system-generated field.

Issue Category
Enter issue category.

Category Description
Enter category description.

Assigned To
Enter the name of the person to whom the issue is assigned.

Programmer Narrative
Enter note for programmer

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F6 screen – To add issue picked for a program

```
X2E/RPG            Work with X2E/RPG Project Control          Databorough Ltd.
XARWKPRJL       Project: AACA2EDEMO  Ref'd Project: *NONE             11:53:11
                                                                    21 Jan 2013
 Program Name . . . . . . . . .
 Text . . . .
 Issue Type . . . . . . . . . .
 Date and Time of event . . . .    2013-01-21  10.43.21
 Issue Category . . . . . . . .
 Category Description .
 Assigned To  . . . . . . . . .
  Programmer Narrative
```

Option 4 – Delete
Use this option to delete the reported issue.

Option 5 – Display
Use this option to display the reported issue.

Option 7 – Notes
Use this option to provide notes related to the issue.

Option 8 – Comp. Errors
Displays Compilation Errors for the program.

Option 9 – Missing Files
Displays Missing Files required by the program.

F20 – Summary
Displays Project Summaries. The user can see various project summaries by opting for F15.

F21 – Project Notes
Displays Project Notes.

F22 – File Errors
Reports the File in Errors

F22 screen – Files in Error

```
X2E/RPG                Work with X2E File Errors              Databorough Ltd.
XARWKDBERR      Project: AA2EDEMO    Ref'd Project: RF2EDEMO          11:56:21
                                                                    21 Jan 2013


Error   File       Field       Description

FFD0001 EDAAPI                 File: EDAAPI not in XOBJECT









                                                                        Bottom

F1=Help   F3=Exit   F12=Cancel
```

X-2E DATA AREAS

The user can customize the X-2E settings to meet the project-specific needs. These can be controlled by the data areas available in the X-Analysis cross-reference library. The purpose of each data area has been detailed below:

Synon Date Fields

This data area indicates that the Date Fields have already been processed. If the process is successful in processing the date fields, it sets the **XS2EDTSRUN** data area to ***YES**. The default value is ***NO**.

Synon Entry Parameters

The entry parameters processing for a Synon application is governed by the reengineering process and the details are maintained in a **XS2ELDLOG** log file. The **XS2EEPVFD** data area is set to ***YES** to indicate that the entry parameters have been processed successfully. The default value is ***NO**.

Synon Product Library for the Edit Code Definitions

The X-2E reengineering process is capable of obtaining the edit codes definitions stored in **YEDTCDERFP** file. The **XS2EEWLIB** data area has a value 'Y2SY' by default, which helps in locating the base product library for the 'PRD Edit code definitions' file. You can change the data area value to suit your environment. As an example, 'Y1SY' is another base product library.

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Synon Edit Code Definitions Processed

X-2E has the requisite capability to integrate the Synon edit code definitions into the X-Analysis edit code definitions table, **XEDITC**. This in turn will be accessed by the reengineering process, when required. The process sets the **XS2EEWRUN** data area to ***YES** if the Synon edit code definitions are successfully processed, else it will remain unchanged. The shipped value is ***NO**.

Synon Field Mapping Fix

The X-2E reengineering process maintains the field mapping data in X-2E databases. The value in the **XS2EFIEFIX** data area will be set to '***YES**' if the reengineering process manages to fix both external and internal Synon field mappings successfully. By default, the **XS2EFIEFIX** data area is set to '***NO**'.

Synon EXCUSRSRC Function

The residual logic is a high-level view of a Synon program. The X-2E feature allows the user to merge the user source (invoked by **EXCUSRSRC** function) into the Synon program to present a complete view of the residual logic. By default, this functionality is always available and the **XS2EMRGEUS** data area is set to ***YES**. If it is changed to ***NO**, then the X-2E process will not merge the user source into the Synon program.

Synon Debug Data

This X-2E feature allows the user to maintain the Synon debug data in the **XS2EDEBUG** file in the cross-reference library. To enable this feature, the user needs to change the value of the **XS2ERUNDBG** data area to ***YES**. By default, the data area XS2ERUNDBG is set to ***NO**.

Synon Consolidated RTVCND Values

The X-2E reengineering process creates the **RTVCND** values in the **XS2EYYCNDX** table. This is a special feature which works only when the user sets the value of the **XS2EYYRUN** data area to ***YES**. By default, it is set to ***NO**.

Synon Prototype Library

By default, the Synon base product library is set to 'Y2SY' for the various X-2E functionalities. In case it does not match your setup, then change the **XA2EPROLIB** data area to suit your environment. As an example, 'Y1SY' is another base product library.

Appendix E – Overriding Data Tables

SYNON FUNCTION KEY / OPTION DEFAULTS

The **XS2EFODFT** table identifies default function keys and options, their texts and action type. Applications may re-assign the *PREVIOUS key from **F12** to **F24**, and use "A" for *DELETE and "Z" for *DETAIL.

Table Structure for XS2EFODT

```
A       R XS2EFODFTF
A         S2ODTYP      1A       TEXT('Function Key/Option')
A         S2ODVAL      2A       TEXT('Value')
A         S2ODOVL      2A       TEXT('Override Value')
A         S2ODTXT     50A       TEXT('Text')
A         S2ODACT     20A       TEXT('Action')
A* ------------------------------------------------------------
A       K S2ODTYP
A       K S2ODVAL
A* ------------------------------------------------------------
```

Default Values of the Table XS2EFODT

S2ODTYP	S20DVAL	S2ODOVL	S2ODTXT	S2ODACT
F	03		Exit	***EXIT**
F	09		Add/Change	***ADD/*CHANGE**
F	11		Delete	***DELETE**
F	12		Cancel	***PREVIOUS**
O	01		Select	***SELECT**
O	04		Delete	***DELETE**
O	05		Display	***DETAIL**

Example – Modified Values for the Table XS2EFODT

S2ODTYP	S20DVAL	S2ODOVL	S2ODTXT	S2ODACT
F	03		Rinucia	***EXIT**
F	09		Modo<Inser>::Modo <Modif.>	***ADD/*CHANGE**
F	11		Annullamento	***DELETE**
F	12	24	Ritorna	***PREVIOUS**

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S2ODTYP	S20DVAL	S2ODOVL	S2ODTXT	S2ODACT
O	A		Cancellazione	***SELECT**
O	Z		Zoom	***DELETE**
O	01		Selezione	***DETAIL**

SYNON FUNCTION KEY/OPTION EXTRA DEFAULTS

The **XS2EFOXTR** table details additional function key usage. In some applications, **F12** could be an extra default function key for the functions listed.

Table Structure for XS2EFOXTR

```
A       R XS2EFOXTRF
A         S2OXTYP      1A      TEXT('Function Key/Option')
A         S2OXVAL      2A      TEXT('Value')
A         S2OXFNT      10A      TEXT('2E Function Type')
A* ------------------------------------------------------------
A       K S2OXTYP
A       K S2OXVAL
A* ------------------------------------------------------------
```

Sample Values for XS2EFOXTR

S2OXTYP	S20XVAL	S2OXFNT
F	12	PMTRCD
F	12	DSPRCD
F	12	EDTRCD
F	12	SELRCD

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Appendix F – X2E Specific Features

The X2E reengineering process is a two-part process.

1. Reengineering of non-2E programs and EXCUSRSRC members.
2. Reengineering of 2E programs.

REENGINEERING OF NON-2E PROGRAMS

This entails the following steps:

Generate Business Rules

In this process, the business rules are generated and object/source level information i.e. Files used in the program, External data structure declared in a program, program calls, file/field info, entry parameters, program declared fields, actual source code and other object-related information is extracted and stored in various X-Ref files. This information is then used by X2E reengineering process to create procedure-based module/service program.

Reengineer Programs

Program Restructuring

Here, the original RPG/COBOL source code is converted from language-specific syntax into a general format (e.g. MOVE/MOVEL/ADD/SUB etc. statements get converted into ASSIGN with proper conversion). In case of interactive program, the source code gets restructured to extract each logical screen as an equivalent function and related processing logic. Thereby, each logical screen is recovered as an equivalent function to be converted into JSF (Java) / XAML (Silverlight). The batch programs are simply converted without any restructuring. The restructured code is stored in the X-Ref library.

Service module generation

Having restructured the code, the process creates procedure-based module and service programs with all subroutines/procedures converted into procedures. For interactive programs, the exportable procedures are created for the functions which could be used either from the controller Javabean or from RPG screen controller module.

Refactoring

In this process, all the special characters (i.e. #, @ or $) which are not allowed in java literals are replaced with allowed characters to make a valid Java/C# literal. If a special character is used on a PF/LF, a new LF is created by renaming the fields with the java-acceptable names. The original file is then replaced in the program with the new file along

with the new fields throughout the program. In case a program contains a Display/Printer File and that file contains special characters in field names, a new file with the same name is created in X-Ref library. The newly-created file contains java compatible field names and the necessary changes (due to renaming of fields and record formats) are reflected in RPG program.

The data structures (except PSDS, INFDS and Externally-described DS – the Java generation takes care of it suitably) too are converted to standalone fields and the additional code (to reflect the operation on DS/subfields on all its individual converted standalone fields) gets added in the generated procedure-based module.

The assignment of compile time data to the corresponding arrays is also done from the initialise procedure. The conversion on the keyed data structures and Eval-Corr operations is also done in Java-acceptable format.

In the case of EXCUSRSRC, no refactoring and service module generation takes place. However, in order to handle special characters, the process replaces the special characters in the field names/ source code of the specific program as stored in one of the cross-reference files.

Reengineer 2E programs

The X2E reengineering process refers the 2E model files to extract various details about the functions, fields, files, access paths, conditions, etc. This information is then held in the various cross-reference files created for the purpose. Once the basic information is extracted, the action diagrams of the 2E members are generated from 2E model files. The process then creates the procedure-based RPG source from the action diagram. If a specific 2E member includes any EXCUSRSRC type member, its content (which is recovered and stored in cross-reference files) gets appended. The field definitions of the EXCUSRSRC member are also appended to the program using it.

The parameters (e.g. starting with #I, #O or #B are renamed to start with II, OO and BB) are set accordingly with the long field names which have been passed as the actual parameter from the calling 2E program's action diagram. The example below illustrates this:

DRPRDFR Action diagram (snippet)

```
// Execute function Scan.
EXECUTE FUNCTION(Scan) TYPE(EXCUSRSRC);
PARAMETER(RCD.Oms_status);
PARAMETER(CTL.Oms_status_p12);
PARAMETER(LCL.Scanresult);
```

Execute user source - content of "Scan"

```
* Scan for search string
 * Parameters :
```

```
*  input : #ixutx : te onderzoeken string
*  input : #ixvtx : zoekstring
*  output  #Ounnb : positie
*
D up              C                   const('ABCDEFGHIJKLMNOPQRS-
D                                     TUVWXYZ')
D lo              C                   const('abcdefghijklmnopqrs-
D                                     tuvwxyz')
D ulen            s              3  0
* Initialize parameters
C                   movel     *blank        uscan1           80
C                   movel     *blank        uscan2           80
C                   movel     *blank        utran1           80
C                   movel     *blank        utran2           80
C                   z-add     *zero         uresul            3 0

* Te onderzoeken string saven in uscan2
C                   movel     #ixutx        uscan2
* Zoekstring saven in uscan1
C                   movel     #ixvtx        uscan1
* Lengte van de zoekstring bepalen
C                   eval      ulen=%len(%trim(uscan1))
* Startpositie in de te onderzoeken string bepalen
C                   z-add     1             upos             3 0

* Translate USCAN1 to Uppercase
C     lo:up         xlate     uscan1        utran1
* Translate USCAN2 to Uppercase
C     lo:up         xlate     uscan2        utran2
* Find argument
C     utran1:ulen   scan(e)   utran2:upos   uresul
C                   if        %Error
C                   z-add     999           #ounnb
C                   else
C                   z-add     uresul        #ounnb
C                   endif
```

Code snippet of the generated procedure-based module:

```
IIXUTX = Oms_status;
IIXVTX = SEL_Oms_status;
uscan1 = *blank;
uscan2 = *blank;
utran1 = *blank;
utran2 = *blank;
uresul = *zero;
uscan2 = iixutx;
uscan1 = iixvtx;
ulen = %len(%trim(uscan1));
upos = 1;
utran1 = %xlate(lo:up:uscan1);
utran2 = %xlate(lo:up:uscan2);
uresul = %scan(%subst(utran1:1:ulen):utran2:upos);

if %Error;
oounnb = 999;

else;

oounnb = uresul;
```

```
endif;

      Scanresult = OOUNNB;
```

Let us closely look at the artifacts recovered by the X2E Reengineering process, i.e.:

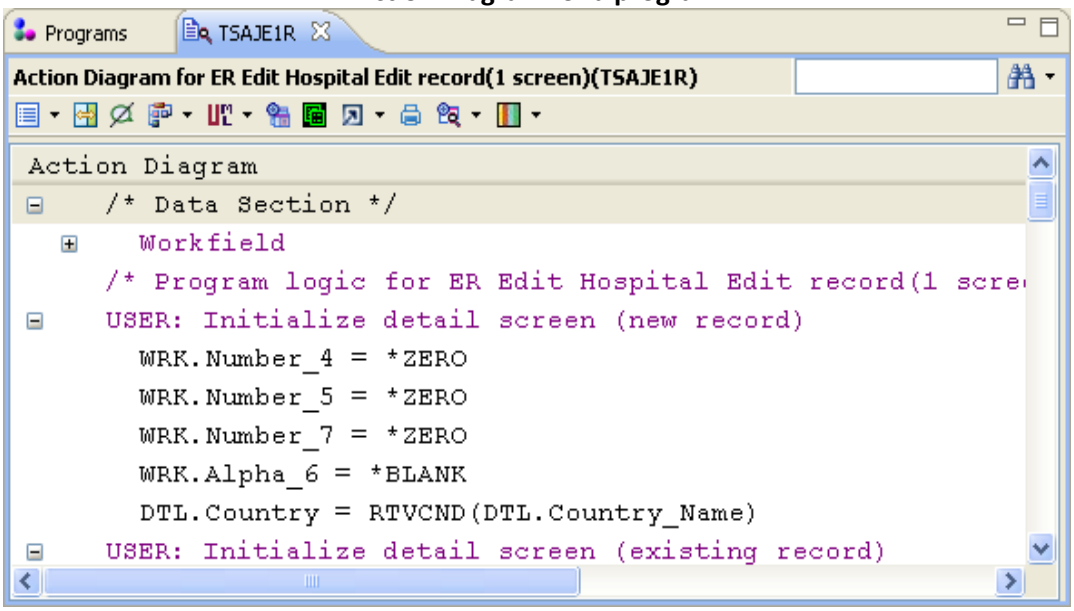
1. Action Diagram
2. Business Rules
3. Residual Logic
4. Re-engineered Action Diagram
5. Re-engineered Controller
6. INTERNAL ROUTINES Objects
7. Business Process Logic Metrics

ACTION DIAGRAM

The X-Analysis Initialization process uses 2E Model to generate Action Diagrams in the cross-reference library. On the X-Analysis Perspective, double-click the **Programs** node under the selected cross-reference to bring up the list of all programs.

Double-click on a program to zoom source into its corresponding Action Diagram (see below).

Action Diagram for a program

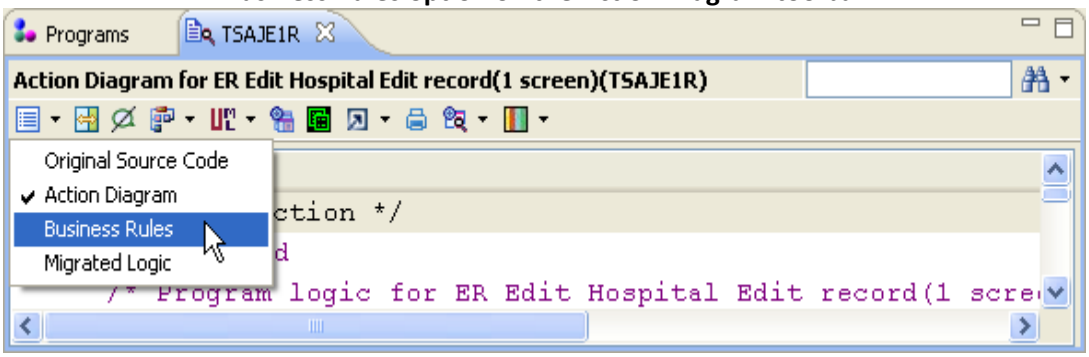


Note that the 'Call' has a '+' before it indicating that the program being called has parameter(s).

BUSINESS RULES

Opt for the **Business Rules** option from the **Source Options** drop-down menu on the Action Diagram toolbar.

Business Rules option on the Action Diagram toolbar



On selecting the **Business Rules** option, the following screen is displayed:

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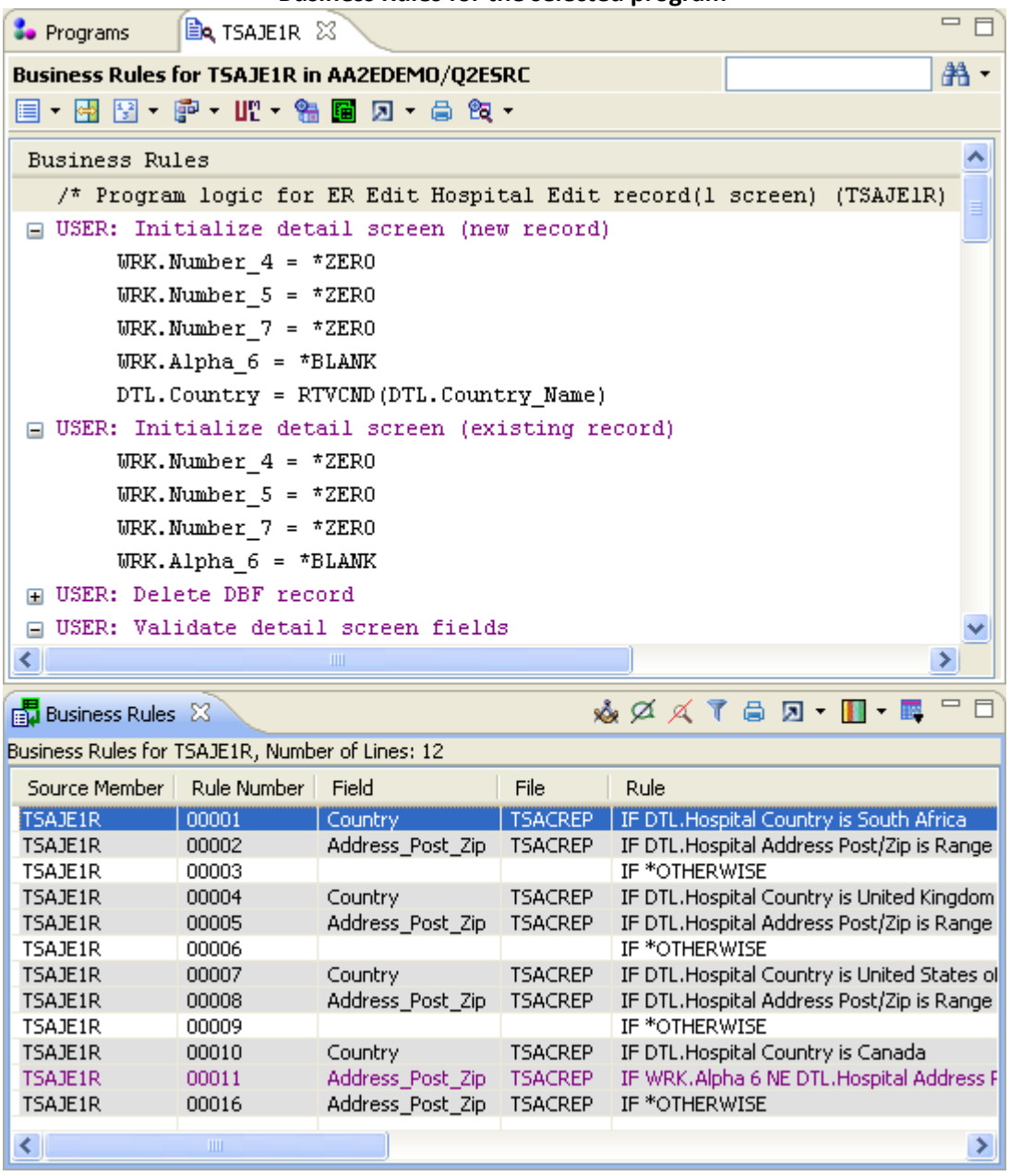
Business Rules for the selected program


Programs
TSAJE1R
Business Rules for TSAJE1R in AA2EDEMO/Q2ESRC
Business Rules
/* Program logic for ER Edit Hospital Edit record(1 screen) (TSAJE1R)
USER: Initialize detail screen (new record)
WRK.Number_4 = *ZERO
WRK.Number_5 = *ZERO
WRK.Number_7 = *ZERO
WRK.Alpha_6 = *BLANK
DTL.Country = RTVCND(DTL.Country_Name)
USER: Initialize detail screen (existing record)
WRK.Number_4 = *ZERO
WRK.Number_5 = *ZERO
WRK.Number_7 = *ZERO
WRK.Alpha_6 = *BLANK
USER: Delete DBF record
USER: Validate detail screen fields
Business Rules
Business Rules for TSAJE1R, Number of Lines: 12
Source Member | Rule Number | Field | File | Rule
TSAJE1R | 00001 | Country | TSACREP | IF DTL.Hospital Country is South Africa
TSAJE1R | 00002 | Address_Post_Zip | TSACREP | IF DTL.Hospital Address Post/Zip is Range
TSAJE1R | 00003 | | | IF *OTHERWISE
TSAJE1R | 00004 | Country | TSACREP | IF DTL.Hospital Country is United Kingdom
TSAJE1R | 00005 | Address_Post_Zip | TSACREP | IF DTL.Hospital Address Post/Zip is Range
TSAJE1R | 00006 | | | IF *OTHERWISE
TSAJE1R | 00007 | Country | TSACREP | IF DTL.Hospital Country is United States of
TSAJE1R | 00008 | Address_Post_Zip | TSACREP | IF DTL.Hospital Address Post/Zip is Range
TSAJE1R | 00009 | | | IF *OTHERWISE
TSAJE1R | 00010 | Country | TSACREP | IF DTL.Hospital Country is Canada
TSAJE1R | 00011 | Address_Post_Zip | TSACREP | IF WRK.Alpha 6 NE DTL.Hospital Address F
TSAJE1R | 00016 | Address_Post_Zip | TSACREP | IF *OTHERWISE

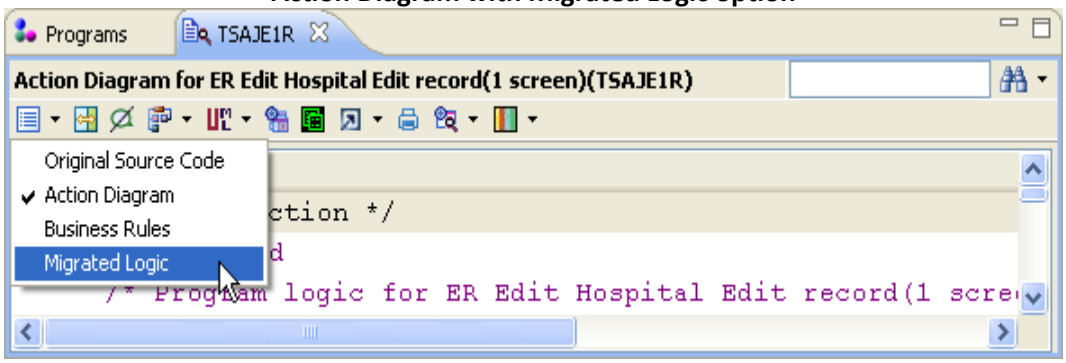
This also opens an additional Business Rules summary window listing all the business rules for the program.

MIGRATED LOGIC

The Migrated Logic is the reorganized/restructured view of what is shown in the Business Rules view. It is also a precursor of what the generated java code will look like. For this, the program should be reengineered first.

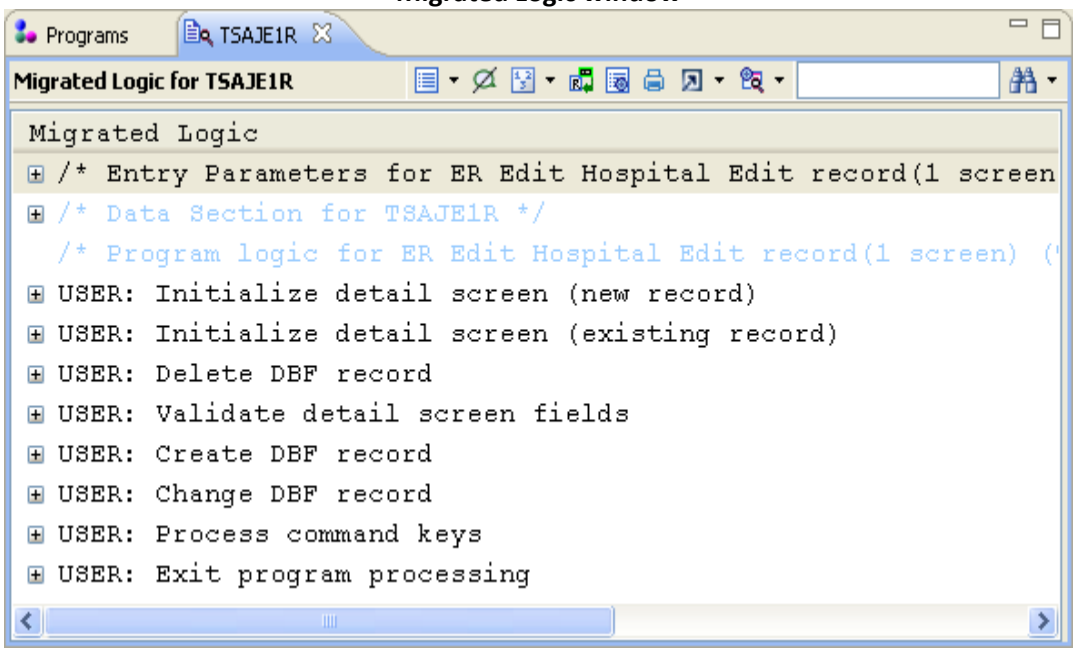
Select the **Migrated Logic** option from the **Source Options** drop-down icon on the Action Diagram toolbar, as shown below:

Action Diagram with Migrated Logic option



On selecting the **Migrated Logic** option, the following window is displayed:

Migrated Logic window


Programs
TSAJE1R
Migrated Logic for TSAJE1R
Migrated Logic
/* Entry Parameters for ER Edit Hospital Edit record(1 screen
/* Data Section for TSAJE1R */
/* Program logic for ER Edit Hospital Edit record(1 screen) (
USER: Initialize detail screen (new record)
USER: Initialize detail screen (existing record)
USER: Delete DBF record
USER: Validate detail screen fields
USER: Create DBF record
USER: Change DBF record
USER: Process command keys
USER: Exit program processing

REENGINEERED ACTION DIAGRAM

The Reengineered Action Diagram is available only when the Reengineering process is over. The following screen displays the **Reengineered Action Diagram** option from the Action Diagram toolbar:

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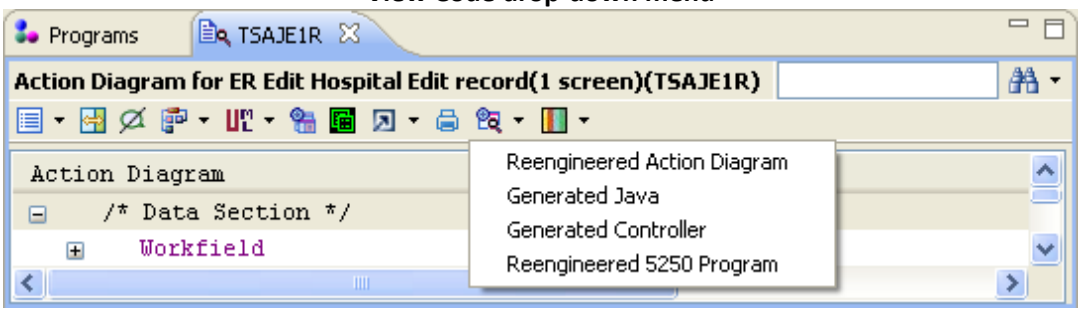
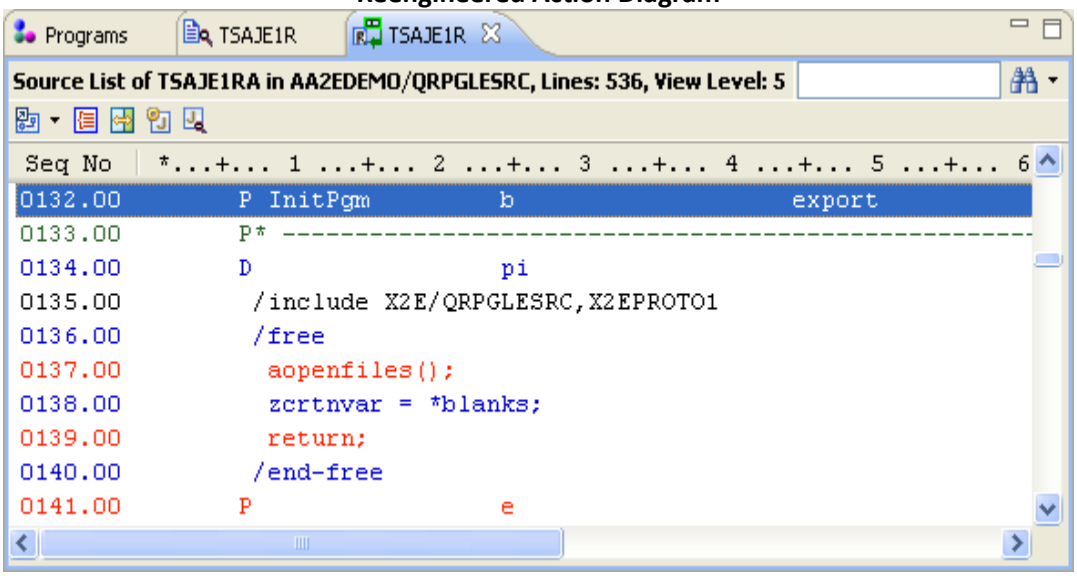
View Code drop-down menu



The Reengineered Action Diagram is the RPGLE member, generated for the Action Diagram. This is created in the name <Program>A e.g. DRPZE1RA.

Reengineered Action Diagram

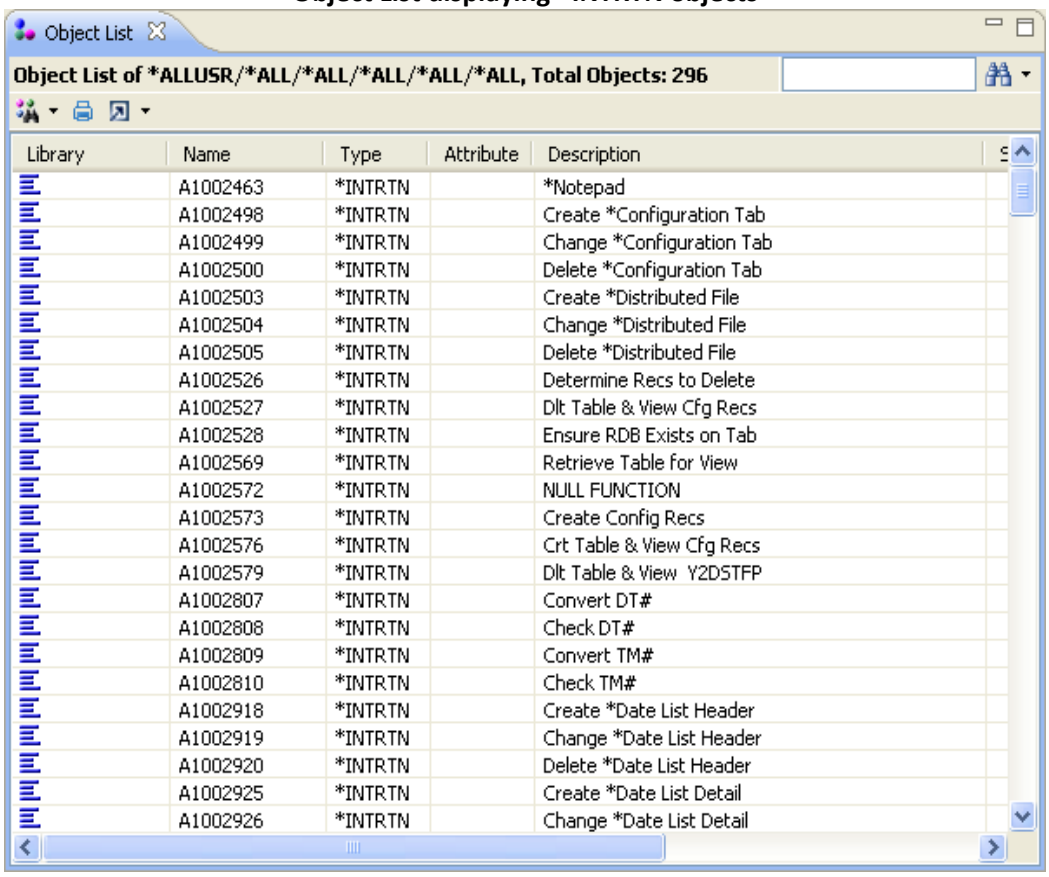


INTERNAL ROUTINES OBJECTS

The X-Analysis Initialise process uses the Model information to identify internal routines. This information is maintained in the X2E repository in the **XS2EANXRF** file.

Opt for *INTRTN on the **Work with Objects** dialog. This displays the following screen:

Object List displaying *INTRTN objects

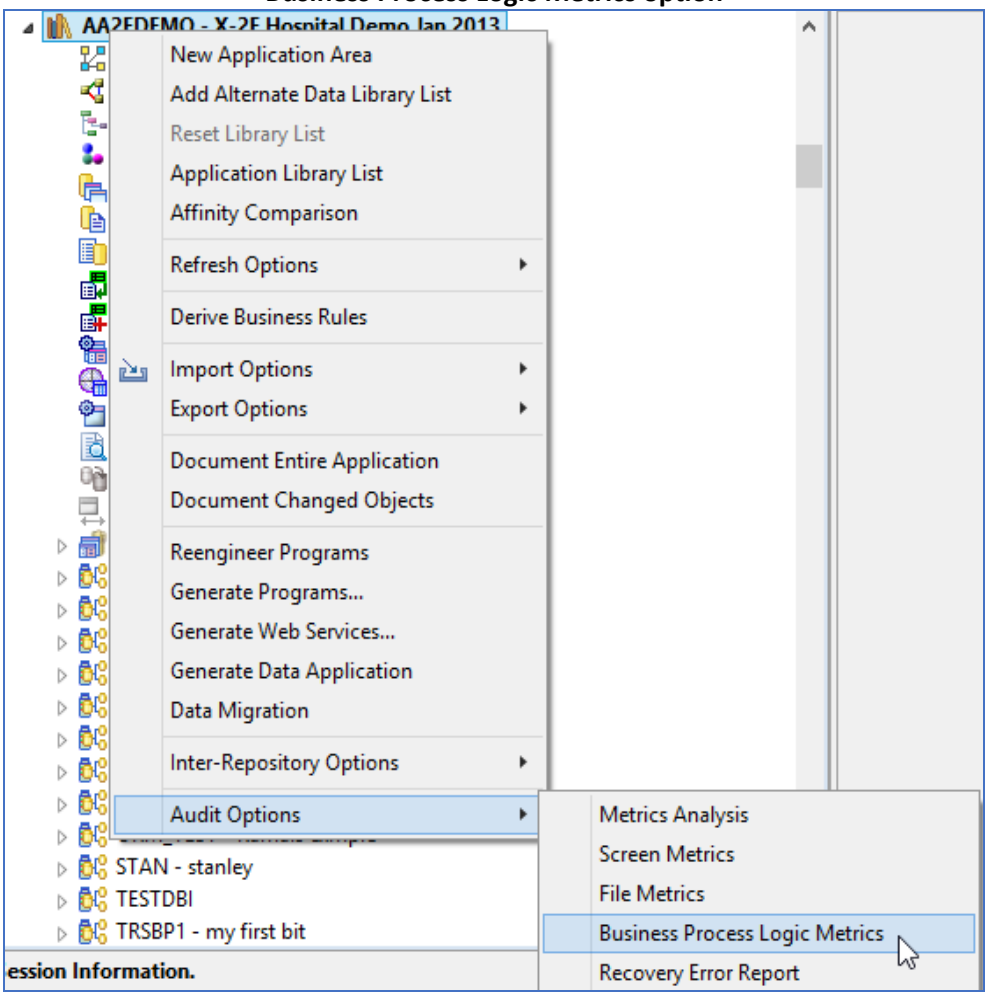


Library	Name	Type	Attribute	Description
	A1002463	*INTRTN		*Notepad
	A1002498	*INTRTN		Create *Configuration Tab
	A1002499	*INTRTN		Change *Configuration Tab
	A1002500	*INTRTN		Delete *Configuration Tab
	A1002503	*INTRTN		Create *Distributed File
	A1002504	*INTRTN		Change *Distributed File
	A1002505	*INTRTN		Delete *Distributed File
	A1002526	*INTRTN		Determine Recs to Delete
	A1002527	*INTRTN		Dlt Table & View Cfg Recs
	A1002528	*INTRTN		Ensure RDB Exists on Tab
	A1002569	*INTRTN		Retrieve Table for View
	A1002572	*INTRTN		NULL FUNCTION
	A1002573	*INTRTN		Create Config Recs
	A1002576	*INTRTN		Crt Table & View Cfg Recs
	A1002579	*INTRTN		Dlt Table & View Y2DSTFP
	A1002807	*INTRTN		Convert DT#
	A1002808	*INTRTN		Check DT#
	A1002809	*INTRTN		Convert TM#
	A1002810	*INTRTN		Check TM#
	A1002918	*INTRTN		Create *Date List Header
	A1002919	*INTRTN		Change *Date List Header
	A1002920	*INTRTN		Delete *Date List Header
	A1002925	*INTRTN		Create *Date List Detail
	A1002926	*INTRTN		Change *Date List Detail

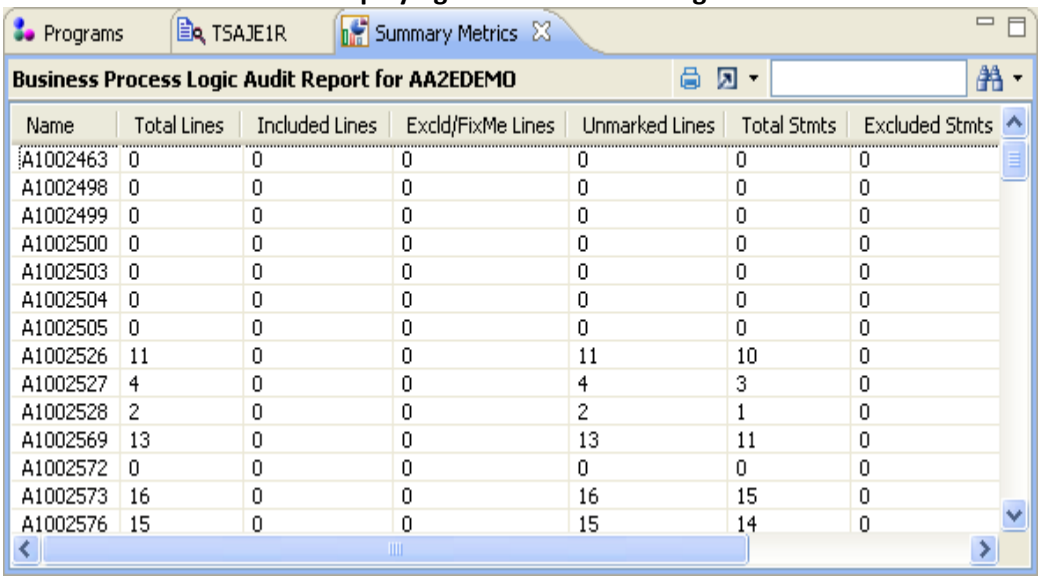
BUSINESS PROCESS LOGIC METRICS

Select **Audit Options** on the context menu over the cross-reference library and choose the **Business Process Logic Metrics** option from it, as is shown below:

Business Process Logic Metrics option



Window displaying Business Process Logic Metrics



Name	Total Lines	Included Lines	Excld/FixMe Lines	Unmarked Lines	Total Stmts	Excluded Stmts
A1002463	0	0	0	0	0	0
A1002498	0	0	0	0	0	0
A1002499	0	0	0	0	0	0
A1002500	0	0	0	0	0	0
A1002503	0	0	0	0	0	0
A1002504	0	0	0	0	0	0
A1002505	0	0	0	0	0	0
A1002526	11	0	0	11	10	0
A1002527	4	0	0	4	3	0
A1002528	2	0	0	2	1	0
A1002569	13	0	0	13	11	0
A1002572	0	0	0	0	0	0
A1002573	16	0	0	16	15	0
A1002576	15	0	0	15	14	0

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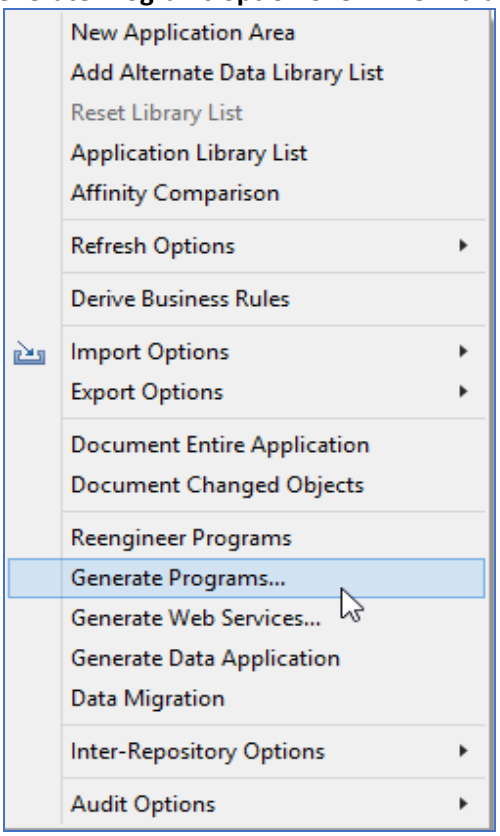
GENERATING JAVA APPLICATION

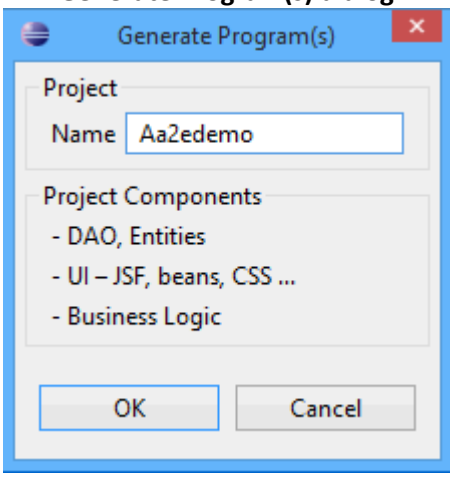
Once the reengineering process completes, the user can opt to generate a Java application. He can use the **Generate Programs** option available on the context menu over a selected cross-reference library or an application area.

Generate Programs option over X-Ref library



This presents the following dialog:

Generate Program(s) dialog



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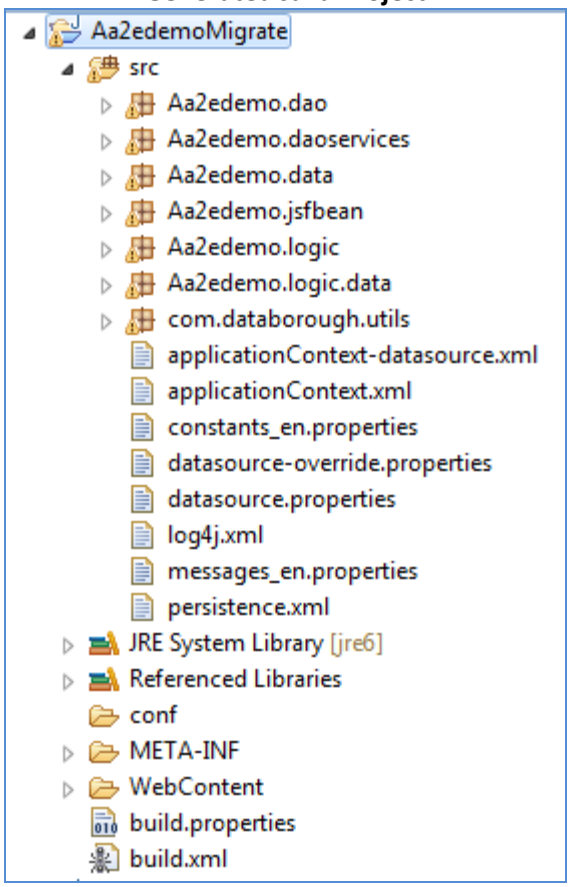
Click **OK**. The process generates the following components:

- Java for Business Rules under .logic and .logic.data package.
- DAO components for each Physical file. These are held in .dao, .daoservices and .data packages of the Java project.
- Managed Javabeans (.java) for each JSF under .jsfbean package.
- Java Server Faces (JSF) for each reengineered screen is created under WebContent folder.

The process on completion prompts the user to switch to Java Perspective, if desired. If selected, Eclipse perspective switches to Java and the user gets to see the Java project generated by the Re-generate Programs.

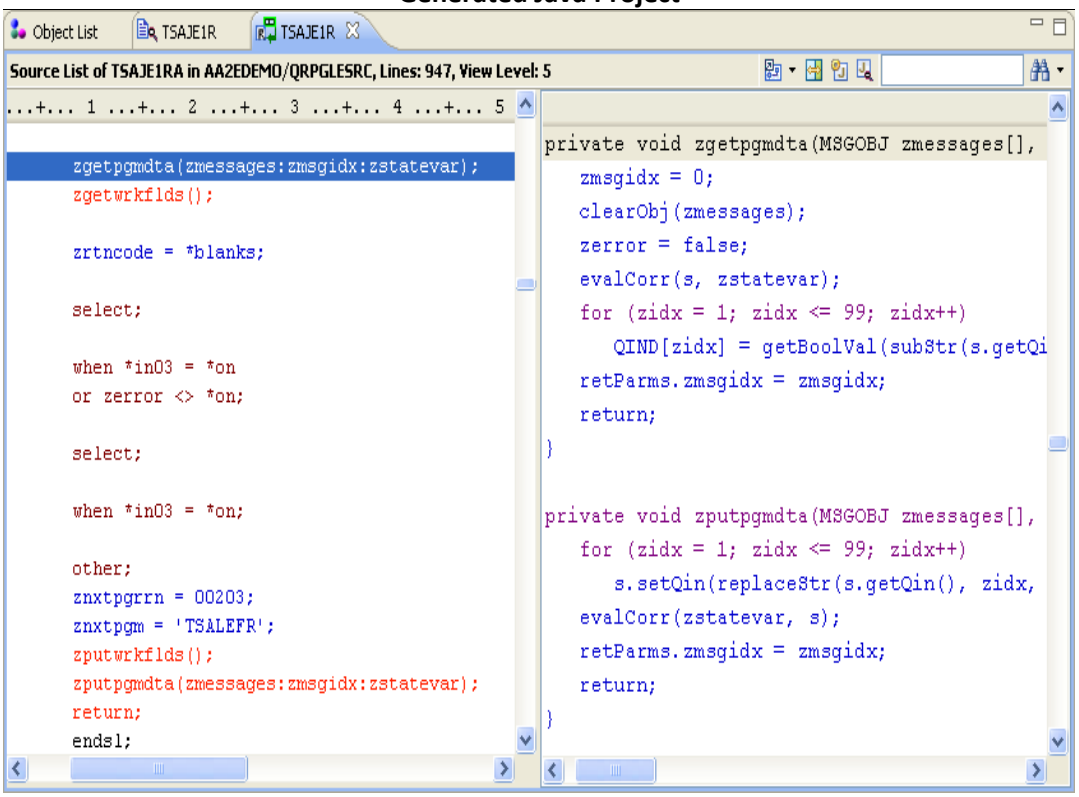
The screenshot below shows the generated Java project with both 'Generate Business Logic & DAO' and 'UI' checkboxes checked.

Generated Java Project



The tool also gives the option to review the Reengineered Action Diagram and the generated Java code side-by-side by clicking the **Show Spilt Panel** icon on the Reengineered Action Diagram view.

Generated Java Project



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Appendix G – Troubleshooting

It is recommended that after the X-Analysis Client installation/upgrade, the first invocation should be done using the 'Clean start Eclipse' shortcut from the X-Analysis program group. The subsequent X-Analysis sessions can be started using the 'X-Analysis for Eclipse' shortcut.

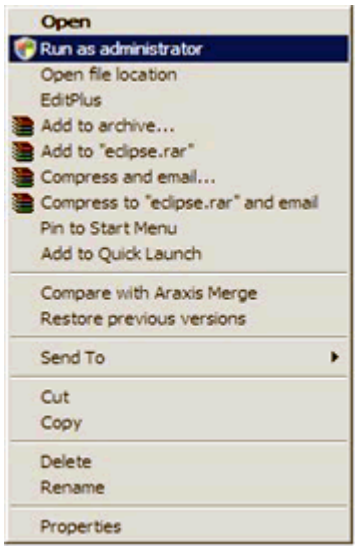
X-Analysis Perspective not visible/working after upgrading X-Analysis Client

Close the X-Analysis Perspective and exit from Eclipse/WDSc/RDi/RBD. Use the **Clean start Eclipse** option for X-Analysis invocation.

In case of Windows Vista and above, a user may need to select the **Run as administrator** option.

Opt for the context menu on the **Clean start Eclipse/X-Analysis for Eclipse** shortcut (from the X-Analysis program group), and then select the **Run as administrator** option as shown in the screen below:

Context Menu for Run as administrator



This will launch Eclipse correctly and the user will be able to switch to the X-Analysis Perspective.

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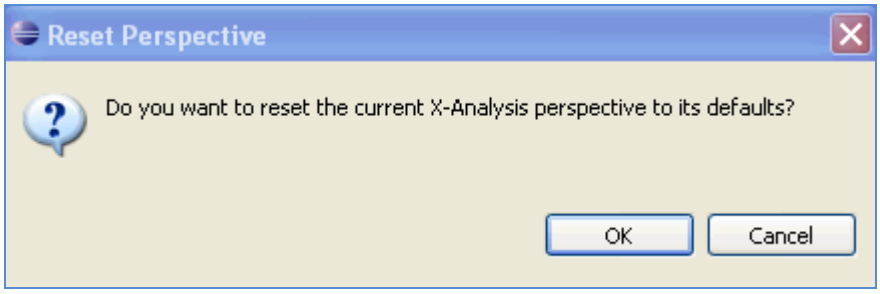
X-ANALYSIS MENU ON THE MAIN MENU BAR DISAPPEARS FROM X-ANALYSIS PERSPECTIVE

Sometimes, it so happens that the X-Analysis menu on the main menu bar disappears. Use the **Window->Reset Perspective** option to restore it.

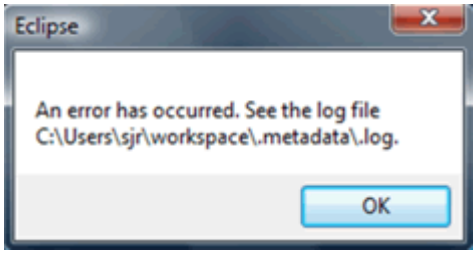


Also, Eclipse allows the users to drag and drop various views. If some of the X-Analysis views are accidentally closed or are not visible, the **Window->Reset Perspective** option should be used to restore them.

ERROR IN RUNNING X-ANALYSIS INSTALLED ON WINDOWS VISTA FOR THE FIRST TIME

This is observed when:

- The user has installed XARuntimeEnv8_x_x.msi
- On running X-Analysis, the following error message is reported:



Check the XAPlugin.log file (available under **X-Analysis > Open Log folder**), to see if it has the following line: "java.lang.UnsatisfiedLinkError: no swt-win32-3232 in java.library.path." This means that swt-win32-3232 file is not copied to the system folder.

The reason is that UAC (User Account Control, the security feature in Windows Vista) is ON and does not allow the user to write in the system folders e.g. C:\Program Files, C:\Windows etc.

To correct this, the user needs to opt for the context menu on the **Clean start Eclipse/X-Analysis for Eclipse** shortcut and select the **Run as administrator** option. Refer to the description of the option given above.

INITIALIZATION REPORTS

After initializing an IBM i application various log reports are generated by the X-Analysis server. The log reports generated are categorized as:

- Program Reference Exclusions
- Missing Object and Source

Program Reference Exclusions

These exclusions are specified in the **XAOBJ/XPGREXCS** file.

X-Analysis is shipped with **XPGREXCS** file containing values QRN*, QLE*, QC*, QM*, QS*. The file is duplicated into the user's X-Analysis library.

Any program reference specified in this file is excluded from the X-Analysis program cross-reference database, **X@XPGRF**.

Two reports are produced to list all actual exclusions:

- XARRMIVN program reports on exclusions from the DSPPGMREF output
- X@PMX1 program lists exclusions from the QBNLPGMI output

The above reports assist the users to interpret the outcome of the initialisation command run on an IBM i application.

Missing Object and Source

Various programs in X-Analysis initialization process write mismatches to all logs. These mismatches are printed out under the following headings:

- References to Objects not loaded
- References to Sources not loaded
- Source Code without Objects

The above reports assist the user to interpret the outcome of the initialization command, run on an IBM i application.

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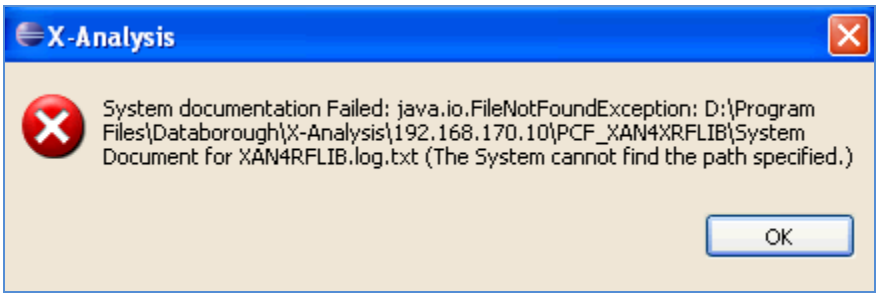
SYSTEM DOCUMENTATION FAILED: FILENOTFOUNDEXCEPTION

On executing the X-Analysis Documenter, if the following error is reported:


X-Analysis
System documentation Failed: java.io.FileNotFoundException: D:\Program Files\Databorough\X-Analysis\192.168.170.10\PCF_XAN4XRFLIB\System Document for XAN4RFLIB.log.txt (The System cannot find the path specified.)
OK

This means that the user does not have rights to create files under Program Files folder.

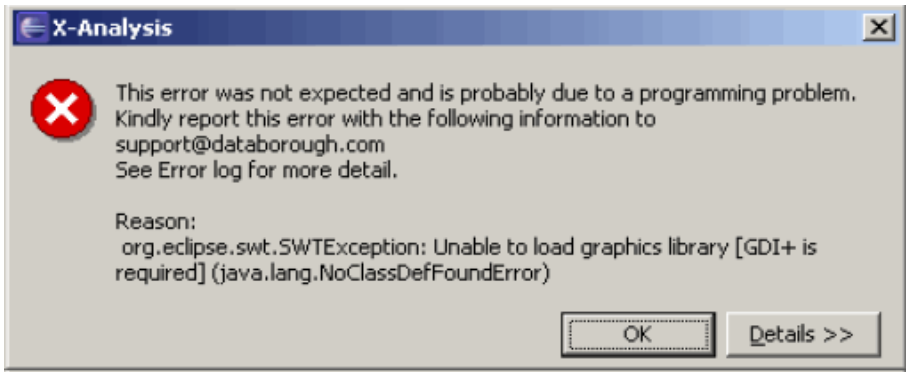
Do the following to get around this problem:

1. On WDSc, under the X-Analysis menu, opt for **Change Application Folder**. Select the folder for which you have full rights.

2. Opt for the **Documenter** again.

SWTEXCEPTION ON WINDOWS 2000 MACHINES

If the following error is reported on opting for diagrams in X-Analysis running under Windows 2000 machine:


X-Analysis
This error was not expected and is probably due to a programming problem.
Kindly report this error with the following information to
support@databorough.com
See Error log for more detail.
Reason:
org.eclipse.swt.SWTException: Unable to load graphics library [GDI+ is required] (java.lang.NoClassDefFoundError)
OK
Details >>

This can be corrected as follows:

This is the SWTException that is reported on the Windows 2000 machines. The cause for this exception is the absence of GDI+ library (gdiplus.dll) on Windows 2000. On Windows XP and Vista, it is available by default. The user needs to download the required DLL (gdiplus.dll) from Microsoft site

http://www.microsoft.com/downloads/details.aspx?FamilyID=6a63ab9c-df12-4d41-933c-be590feaa05a&DisplayLang=en

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Download and copy the GDIPLUS.DLL to the default installation directory e.g. C:\PROGRAM FILES\DATABOROUGH\ECLIPSE\JRE\BIN

Restart X-Analysis and the diagrams should show up now.

SCREEN/REPORT DESIGN FEATURE FAILS WITH SERVER JOB ERROR

If the **Screen/Report Design** feature was working fine earlier and is now giving error, then look at the Server Job associated with X-Analysis.

1. Identify the QZDASOINIT job associated with the XA session and look for the USER NAME/QPRTJOB messages. For example:

   Message . . . . : A duplicate job named 103581/MARK/QPRTJOB was found.
   Message . . . . : A duplicate job named 161482/MARK/QPRTJOB was found.

2. Run the following command on the session:
   WRKSPLF SELECT(*ALL) JOB(103581/MARK/QPRTJOB) and
   WRKSPLF SELECT(*ALL) JOB(161482/MARK/QPRTJOB).
   Take **Option 4** against the spool files to delete them.

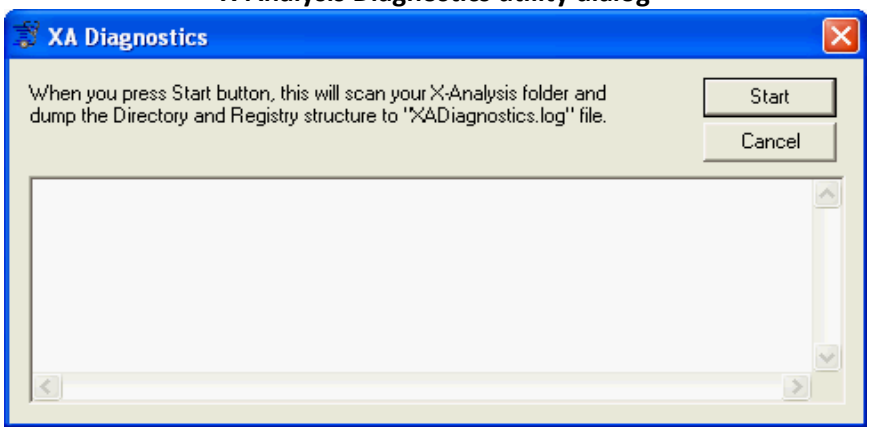
3. Opt for the **Screen/Report Design** feature again. This should be working now.

X-ANALYSIS DIAGNOSTICS UTILITY

The X-Analysis Diagnostics utility is invoked automatically when an exception occurs on X-Analysis; it opens the log folder which has the "XADiagnostics.log" along with other '.log' files. This utility will log entries under CLSID value (for bean), databorough\lib folder structure and information about IBM's Rational product 7.5 and above or Eclipse 3.4 and above.

This utility can also be invoked standalone to provide directory and registry structure related to the X-Analysis installation to a log file. To run this utility, select the **X-Analysis Diagnostics** under the X-Analysis program group:

X-Analysis Diagnostics utility dialog


XA Diagnostics
When you press Start button, this will scan your X-Analysis folder and dump the Directory and Registry structure to "XADiagnostics.log" file.
Start
Cancel

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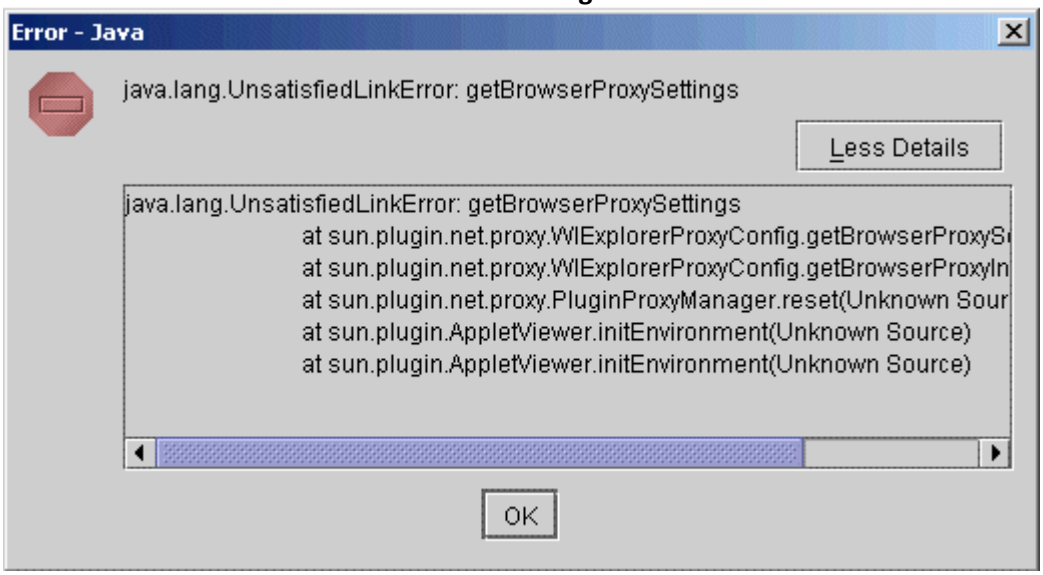
ERROR MESSAGE APPEARS ON SIGNON TO X-ANALYSIS

While signing on to X-Analysis if the following error message is displayed, then please perform the following troubleshooting steps:

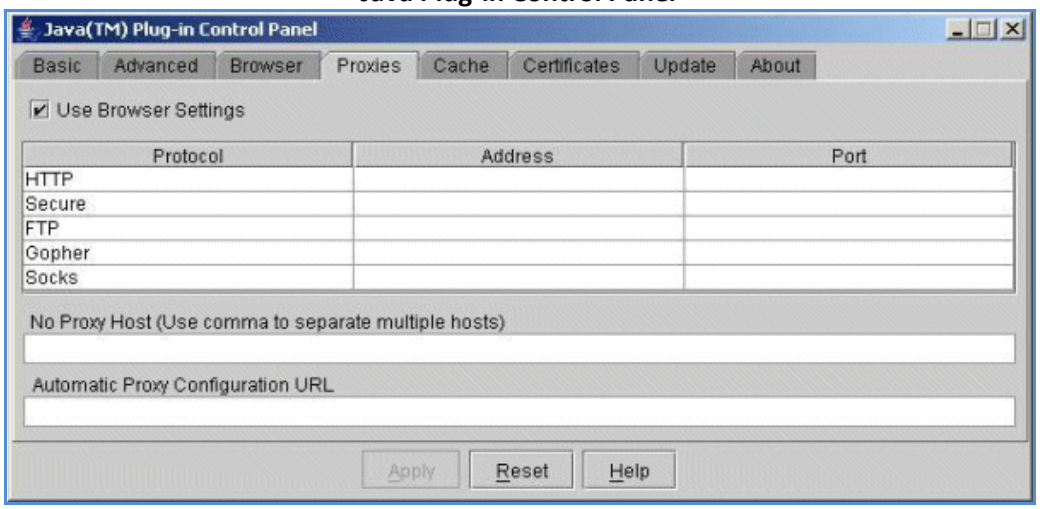
Error dialog



1. Go to the Control Panel.

Double-click the Java Plugin. This opens the Java Plug-in Control Panel.
Go to **Proxies** Panel. The Proxies panel looks like this:

Java Plug-in Control Panel



Uncheck the Use Browser Settings checkbox. Click **Apply** and close the Java Plug-in Control Panel.

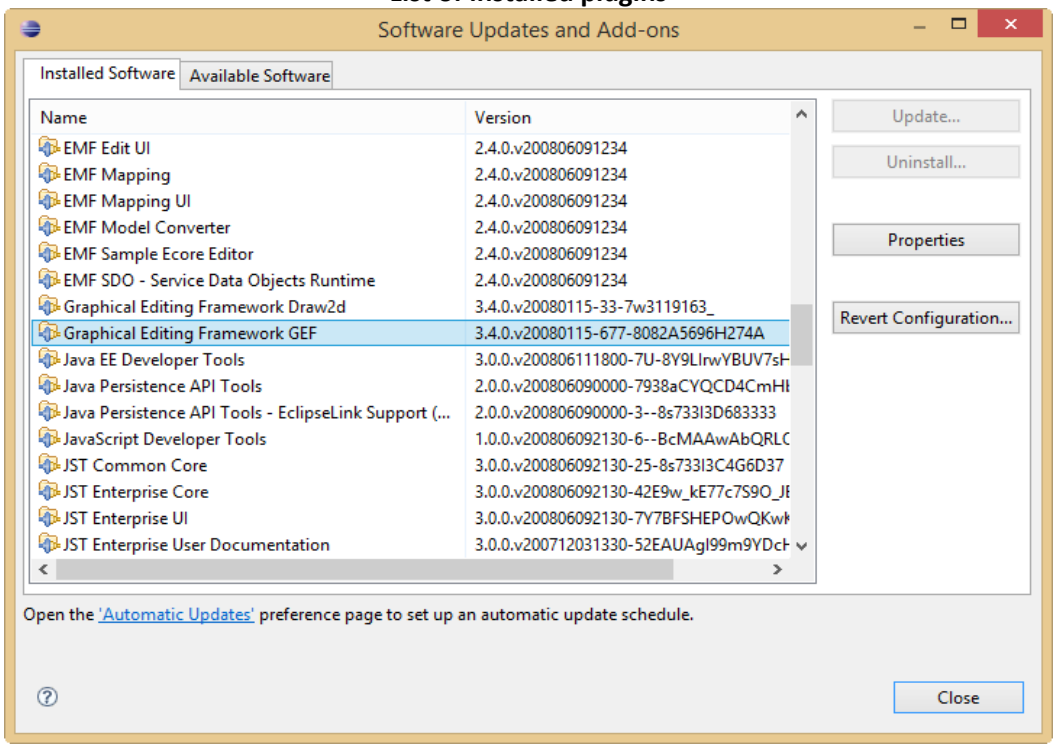
2. Start XA again.

DATA FLOW DIAGRAMS ARE UNAVAILABLE

Sometimes the available version of the Graphical Editor Framework may not be compatible with what is required for the new feature. Perform the following steps to begin viewing the Data Flow Diagrams:

1. On the WDSc, go to **Help** and select **Software Updates**. This will display the list of the installed plugins (as shown below). Look for the Graphical Editor Framework and cross-check the version number. The following image shows the **Software Updates and Add-ons** window

List of installed plugins



If the GEF version number on the user's RDi is below 3.3, the **Data Flow Diagram** will not be displayed. In such a scenario, perform the following steps to update the Graphical Editing Framework:

2. Click on the **Available Software** tab and check for the latest version of the Graphical Editing Framework.

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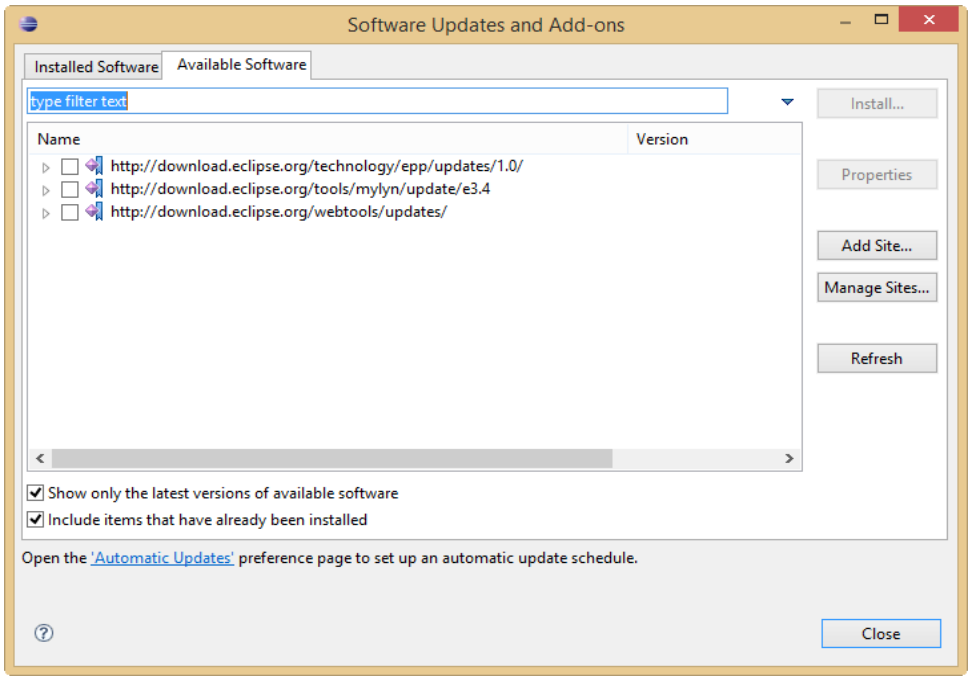
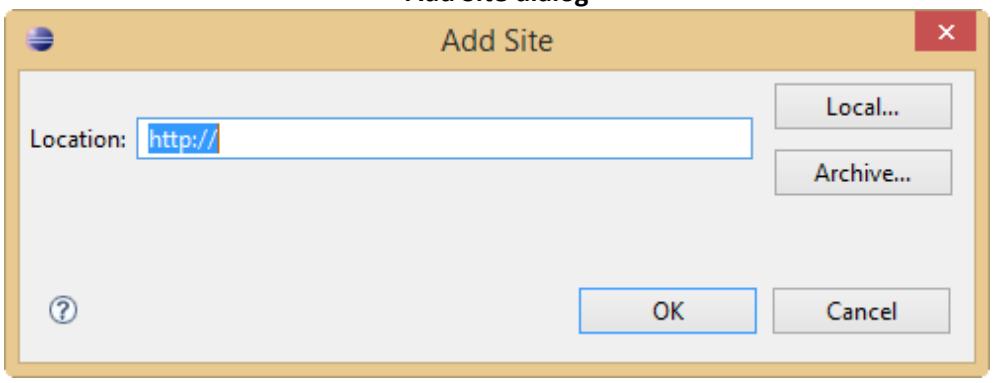
Available Software window



If the installed GEF software is below 3.3, its upgraded version will be shown in the list of available software. Click the relevant box to install the latest version.

If the latest version of the software is not displayed, click on **Add Site**. The following window will be displayed:

Add Site dialog



3. Provide the name of the given site in the Location field:

   http://archive.eclipse.org/tools/gef/downloads/drops/R-3.3-200706281000/

4. Click **OK**.

5. Close the Software Updates and Add-ons window and re-start the WDSc to view the DFDs.

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Note: Verify the current location of the installed X-Analysis. If it is installed on the XA Runtime Environment, you must uninstall the X-Analysis client as well as the XA Runtime. Re-install X-Analysis to resume its working on the WDSc.

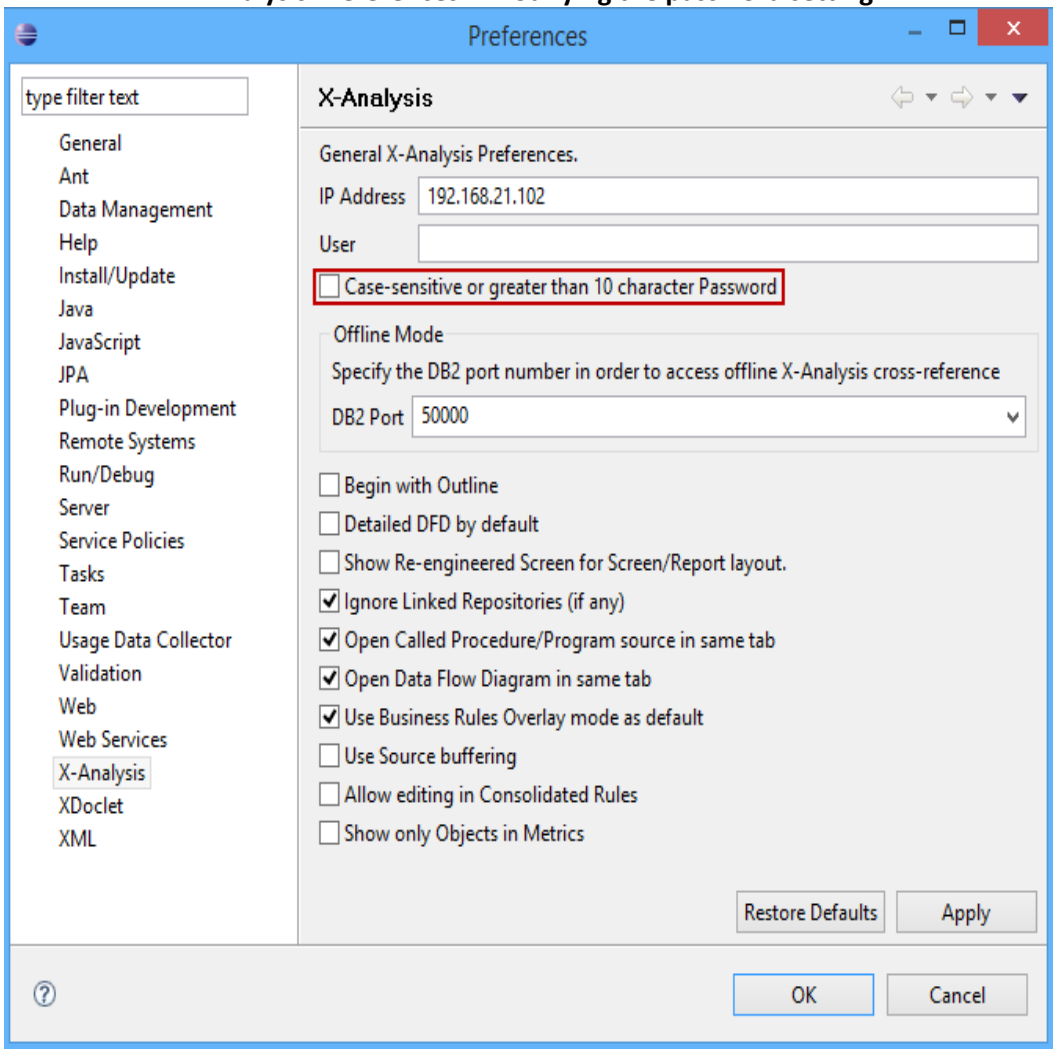
SETTING THE PASSWORD FIELD

To set the password field for more than 10 characters, please perform the given steps:

1. Go to **Window->Preferences->X-Analysis**.

2. Check the **Case-sensitive or greater than 10 character Password** setting and click **OK**. The setting is shown below:

X-Analysis Preferences – Modifying the password setting

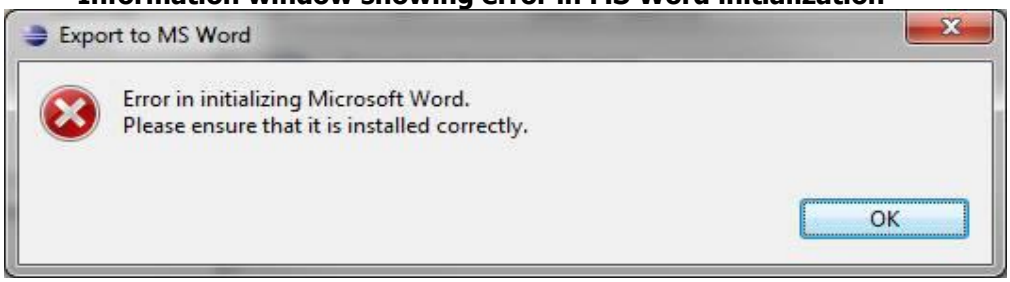


3. Login again. You will be able to input more than ten characters for the password.

ERROR IN GENERATING PROGRAM DOCUMENTATION

There may be instances (while generating program documentation) when you may encounter the following error:

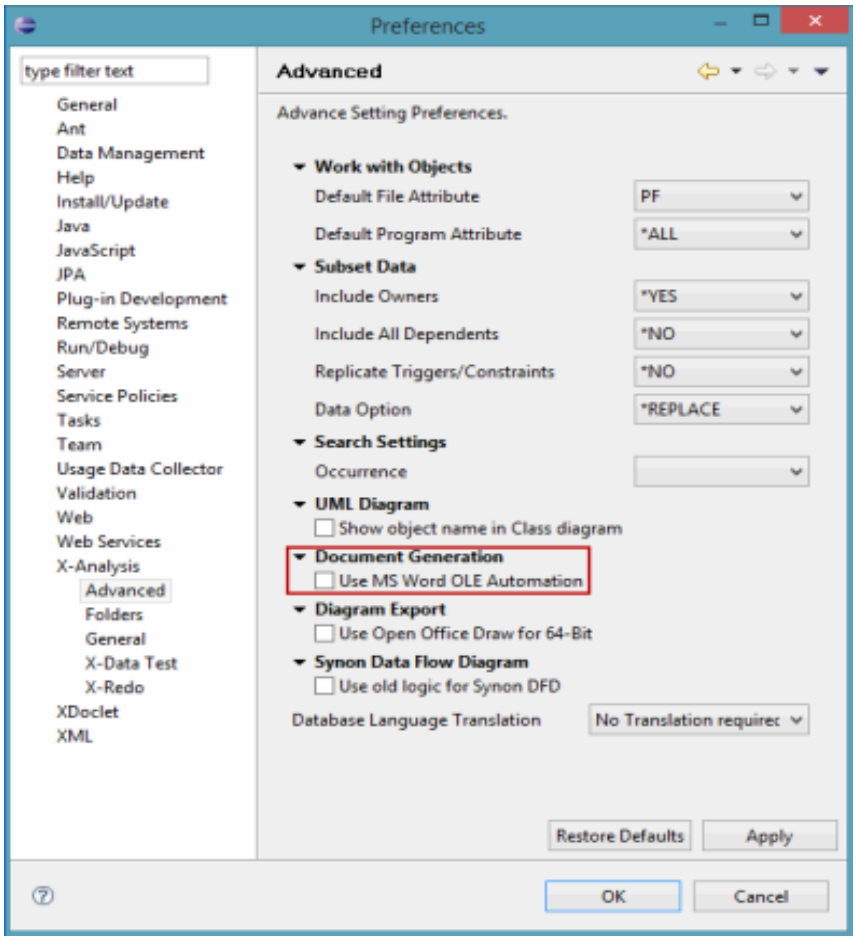
Information window showing error in MS Word initialization



To resolve this error, check the preference setting for documentation.

Go to **Window->Preferences->X-Analysis->Advanced** tab. You will see a specific setting **Use MS Word OLE Automation** under **Document Generation**. Check the box to activate the OLE automation for various documenting and exporting tasks.

Advanced Preferences window – Document Generation



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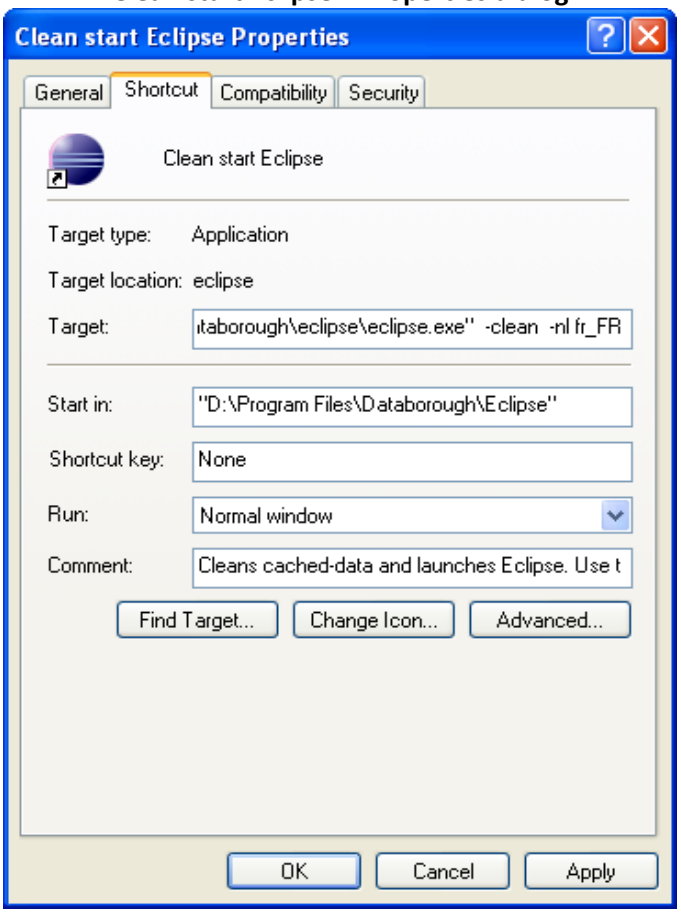
If OLE automation fails, check your OS configuration. For instance, if you have a 64-bit OS, the OLE automation will not work. In such a case, uncheck the **Use MS Word OLE Automation** to continue generating documents in generic format. These documents can be viewed later using MS Office or Open Office.

USING THE FRENCH INTERFACE

If you wish to allow running the Eclipse provided with the Runtime Environment in the **French** mode, you need to edit the properties of the shortcuts provided in X-Analysis group – **Clean start Eclipse** and **X-Analysis for Eclipse**.

Using the **Properties** option on the shortcuts, update the **Target** value by appending ' **-nl fr_FR**' at the end of existing value.

Clean start Eclipse – Properties dialog



In case of any other problem, which is not covered above, the users are requested to send their requests to support@databorough.com along with the log file for the current X-Analysis session. The file can be obtained by using X-Analysis -> Open Log Folder menu option.

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Appendix H – Refresh X-Analysis

X-Analysis provides two commands for the operational maintenance of X-Analysis repository (cross-reference library). These two commands are **XREFRESH** and **XAXREF**.

XREFRESH

The **XREFRESH** command refreshes the cross-reference library to reflect any changes that are made to the cross-reference library. The command refreshes both the sources and objects that are already initialized; it will not look at freshly-added sources or objects.

It is recommended to run this command each night so that the cross-reference reflects the most updated state.

Before using the **XREFRESH** command ensure the following sequence of the library list:

- XAOBJ
- QGPL
- QTEMP

Then, type the **XREFRESH** command on the command line and press **ENTER**. The following screen should appear:

XREFRESH command screen

```
                     Refresh Changed Objects (XREFRESH)

Type choices, press Enter.

X-Analysis Library . . . . . .                 Name
Refresh Application Areas  . . .   *YES          *YES, *NO, Y, N
Refresh Business Rules . . . . .   *NO           *YES, *NO









                                                                      Bottom
F3=Exit    F4=Prompt    F5=Refresh    F12=Cancel    F13=How to use this display
F24=More keys
Parameter XRFLIB required.
```


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Provide the name of the cross-reference library which needs to be refreshed along with other details and click **ENTER** to submit batch job. This batch job refreshes the cross-reference library.

Once the batch job is over, you can check the error log. It is a spool file generated as a result of this batch job. The following screen displays the spool file listing:

Spool file listing

```
                          Work with Job Spooled Files

Job:   XREFRESH       User:   US             Number:   086439

Type options, press Enter.
  1=Send   2=Change   3=Hold   4=Delete   5=Display   6=Release   7=Messages
  8=Attributes        9=Work with printing status

                 Device or                          Total   Current
Opt  File        Queue       User Data   Status     Pages     Page   Copies
     XREPORT     QPRINT      XARPTRLOG    RDY           1                1
     QPJOBLOG    QEZJOBLOG   XREFRESH     RDY        2594                1

                                                                       Bottom
Parameters for options 1, 2, 3 or command
===>
F3=Exit   F10=View 3   F11=View 2   F12=Cancel   F22=Printers   F24=More keys
```

Then, use **Option 5** against spool files to view the report.

Spool file for the XREFRESH command

```
                            Display Spooled File
File  . . . . . :   XREPORT                          Page/Line   1/1
Control . . . . .                                    Columns     1 - 78
Find  . . . . . .
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...
X-Analysis              Audit Log for X4SRCXC XREFRESH Processing
XARPTRLOG
_____________________________________________________________________________
  XREFRESH completed X4SRCXC    at 08.50.56 on 2012-12-10
* * * * * E N D   O F   R E P O R T * * * * *
```

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```
                                                                    Bottom
F3=Exit    F12=Cancel    F19=Left    F20=Right    F24=More keys
Overprinting not displayed.
```

XAXREF

The **XAXREF** command reinitializes the cross-reference library to reflect any changes that have been made to the cross-reference library.

It is recommended to run this command each night (or weekly, as the case may be) so that the cross-reference reflects the most updated state.

Before using the **XAXREF** command ensure the following sequence of the library list:

- XAOBJ
- QGPL
- QTEMP

Then type the **XAXREF** command on the command line and press **ENTER**. The following screen should appear:

XAXREF command screen

```
                      Initialise X-Analysis/4 (XAXREF)

Type choices, press Enter.

X-Analysis Library . . . . . .ABCD            Name




                                                                    Bottom
F3=Exit    F4=Prompt    F5=Refresh    F12=Cancel    F13=How to use this display
F24=More keys
Parameter XRFLIB required.
```

Provide the name of the cross-reference library and press **ENTER** to input further details:

XAXREF command screen

```
                    Initialise X-Analysis/4 (XAXREF)

Type choices, press Enter.

X-Analysis Library . . . . . > ABCD          Name
Object Libraries . . . . . .   *SPECIFIED    Name, *SPECIFIED
               + for more values
Source Libraries . . . . . .   *SPECIFIED    Name, *SPECIFIED, *NONE
               + for more values
Index Source Files . . . . .   *CHG          *CHG, *NO, *ALL, *UPG
Build Data Model . . . . . .   *NO           *YES, *NO
Generate Business Rules  . . .   *NO         *YES, *NO
Initialise X-Resize  . . . . .   *NO         *YES, *NO
Include obsolete source/object     *NO       *YES, *NO
```

If the sources and objects are modified, then the **XAXREF** job needs to run with *CHG option and Build Data model to ***YES** (to track any file level changes in keys, fields etc.), Generate Business Rules to ***YES** (to track any source level changes).

The details of the various options available on the **XAXREF** command are given below:

Feature	Brief Description
X-Analysis Library	The X-Analysis cross-reference library name.
Object Libraries	Special value *SPECIFIED is selected by default. It means that X-Analysis will retrieve all object libraries you have previously specified (using **Option 8**).
Source Libraries	Special value *SPECIFIED is selected by default. It means that X-Analysis will retrieve all source libraries you have previously specified (using **Option 8**).
Index Source Files	Specify whether or not to create indexes over the source files. These indexes will allow the immediate display of "where used" data. They may be required for the generation of the data model, depending on which options are taken. If the indexes are not built now, they can be built for an individual Source Member at the time they are viewed through the X-Analysis browser. Select one of the following: • ***CHG** – Only update current indexes. It will find newly added source members and remove deleted members. It will also index any source member that has changed since the last initialisation. • ***NO** – Do not build the indexes • ***ALL** – It is similar to *CHG when it comes to finding new members and removed members. It will index all source members without checking the change date. • ***UPG** – Upgrade the X-Analysis database and rebuild all data including all indexes (replacing current ones).
Build Data Model	If you take the option to build the data model for your application then you can view it through X-Analysis. Select one of the following: • ***YES** – Build the data model • ***NO** – Do not build the data model **You should have the X-Analysis Professional Module/Modeling set for this to**

Feature	Brief Description
	work.
Generate Business Rules	If you take the option to generate the business rules for your application then you can view it through X-Analysis. Select one of the following: • ***YES** – Generate Business Rules • ***NO** – Do not generate Business Rules **You should have the X-Rules Module/Design Recovery set for this to work. If choosing *YES, Modeling should have been already performed or Build Data Model should be *YES.**
Initialize X-Resize	If you take the option to generate the X-Resize Project for your application then you can view it through X-Analysis. Select one of the following: • *YES – Initialise X-Resize Project • *NO – Do not initialise X-Resize Project **You should have the X-Field Resize Module for this to work.**

Press **ENTER** to submit a batch job to process the **XAXREF** command.

Once the batch job is over, you can check the different log files, which are spool files generated as a result of this batch job. Different sets of spool files are generated based on RPG or 2E environment.

For RPG environment, the following spool files are generated:

Spool File	Message	Purpose
XREPORT	Audit Log for <X-Ref library> Init	Job Initialisation
XREPORT	Audit Log for <X-Ref library> D/B Model Build	If Build Data Model is *YES
XREPORT	Audit Log for <X-Ref library> Business Rule Extraction	If Generate Business Rules is *YES

For 2E environment, the following spool files are generated:

Spool File	Message	Purpose
XREPORT	Audit Report for <X-Ref library> Load on…	Object/Member List
XREPORT	Audit Log for <X-Ref library> Init	Job Initialisation
XBREPORT	SYNON Relationships where foreign keys are missing	Foreign key relationships
XREPORT	Audit Log for <X-Ref library> D/B Model Build	If Build Data Model is *YES
XREPORT	Audit Log for<X-Ref library> Re-engineering Processing	Re-engineering executed
XREPORT	Audit Log for <X-Ref library> Business Rule Extraction	If Generate Business Rules is *YES

To check the generated spool file use the following command:

WRKJOB JOB(JOB NUMBER/USER/XAXREF)

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This should invoke the following similar screen:

Work with Job screen

```
                                Work with Job
                                                              System:   DBSPW6
Job:   QPADEV0021     User:   US             Number:   087868

Select one of the following:

     1. Display job status attributes
     2. Display job definition attributes
     3. Display job run attributes, if active
     4. Work with spooled files

    10. Display job log, if active, on job queue, or pending
    11. Display call stack, if active
    12. Work with locks, if active
    13. Display library list, if active
    14. Display open files, if active
    15. Display file overrides, if active
    16. Display commitment control status, if active
                                                                          More...
Selection or command
===>

F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel
```

Then, use **Option 4** to work with associated spool files:

Job-specific Spool Files

```
                          Work with Job Spooled Files

Job:   XAXREF         User:   US             Number:   087868

Type options, press Enter.
  1=Send   2=Change   3=Hold   4=Delete   5=Display   6=Release   7=Messages
  8=Attributes        9=Work with printing status

                 Device or                          Total   Current
Opt  File        Queue       User Data   Status    Pages     Page   Copies
     XREPORT     QPRINT      XARPTRLOG    RDY         1                1
     XREPORT     QPRINT      XARPTRLOG    RDY         1                1
     XREPORT     QPRINT      XARPTRLOG    RDY         1                1
     QPJOBLOG    QEZJOBLOG   XAXREF       RDY        90                1
```

Then, use **Option 5** against spool files to view the report.

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Appendix I – X-Analysis Indexes Job Scheduler Entries

X-Analysis initialization process (**XA4INIT** command) calls the **XASCDEIDX** and **XAROBOT** commands towards the end of the processing. These commands generate source members for IBM Job Scheduler entries and ROBOT Job Scheduler entries.

X-Analysis initialization process starts the ROBOT processing if it finds files RBTROB8, RBTCMD1 and RBTCS2 all in the same library.

For ROBOT entries, it creates and indexes source members in QCLSRC and writes XMEMBER records. It also populates the **XAROBOTIDX** file.

COMMAND XASCDEIDX

The **XASCDEIDX** command will cross reference the IBM job scheduler entries. A CL source member is generated in the specified library for each job.

This source is then indexed, enabling references to be displayed through the Variable Where Used and the Object Where Used features.

X-Ref Job Scheduler Entries (XASCDEIDX)

```
                  X-Ref Job Scheduler Entries (XASCDEIDX)

Type choices, press Enter.

X-Analysis library . . . . . .              Name
CL source library  . . . . . .              Name
```

X-Analysis Library

Enter the name of the X-Analysis library where the Where Used data should be stored.

CL Source Library

Enter the name of the library where the CL source should be stored. This can be the X-Analysis library itself, if required.

COMMAND XAROBOT

The **XAROBOT** command creates Program References and Global Where Used entries for jobs initiated from the Robot job scheduler.

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Index Robot Scheduler Jobs (XAROBOT)

```
                  Create/Index Robot Sched Jobs (XAROBOT)

Type choices, press Enter.

X-Analysis library . . . . . .               Name
Robot library  . . . . . .                   Name
CL source library  . . . . . .               Name
```

X-Analysis Library

Enter the name of the X-Analysis cross-reference library built for the application containing the jobs scheduled by Robot.

Robot Library

Enter the name of the library that contains the Robot database.

CL Source Library

Enter the name of a library where the program can generate CL source members for each scheduled job entry. You can enter **QTEMP** if you do not wish to keep or view the source programs generated.

Appendix J – Dual Installation of X-Analysis

X-Analysis gets installed on the X-Analysis Runtime Environment if both RDP and Runtime Environment are installed (as preference is given to the Runtime Environment).

In order to run X-Analysis on both the Runtime Environment and RDP 8.5, you must follow the steps given below:

1. Uninstall X-Analysis, which is installed on RDP, and then install X-Analysis Runtime Environment.

2. Install the X-Analysis client.

3. In the location where Runtime Environment is installed (for e.g. C:\Program Files\Databorough\Eclipse) look for a subfolder named dropins. This would have a file named com.databorough.xanalysis.plugin.link

4. Now locate the installation path for RDP. At the same level where eclipse.exe lies (like C:\Program Files\IBM\SDP), look for the dropins folder, or create one if it does not exist. Copy the file as in 3 above to this dropins folder.

5. Copy a shortcut to RDP to desktop. Right-click the shortcut, and select **Properties**. At the end of the 'Target' text box, append –clean.

6. Start RDP using the new shortcut. X-Analysis should be visible as one of the perspectives.

The UML plugin cannot be installed from within Rational 8.5, as the underlying Eclipse Modelling Framework required for these plugins does not match those which Rational has inbuilt. The new version of EMF no longer supports the UML2Tools plugins that are supplied with our UML Support msi.

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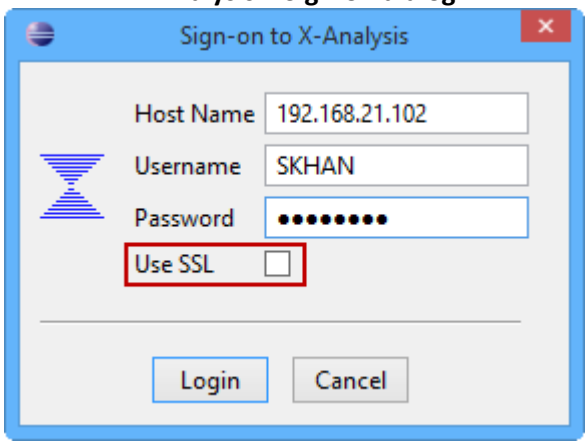
Appendix K – Use SSL feature

The X-Analysis **Sign-on** dialog is equipped with the 'Use SSL' feature. The feature has been introduced as a means to transfer data in a secure manner. The box is unchecked by default. Check the box to enable the feature while working with X-Analysis.

The following screenshot shows the dialog:

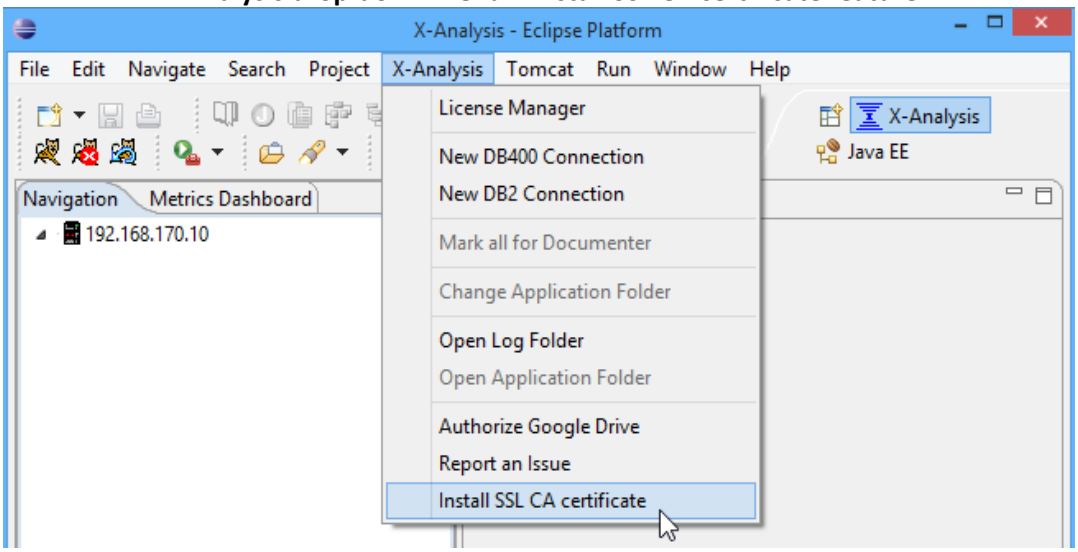
X-Analysis – Sign-on dialog



Before using this feature, you must follow the given steps to establish the SSL connection:

1. Choose the X-Analysis drop-down menu from the X-Analysis toolbar and click on the **Install SSL CA certificate** feature. The selection is shown below:

X-Analysis drop-down menu – Install SSL CA certificate feature



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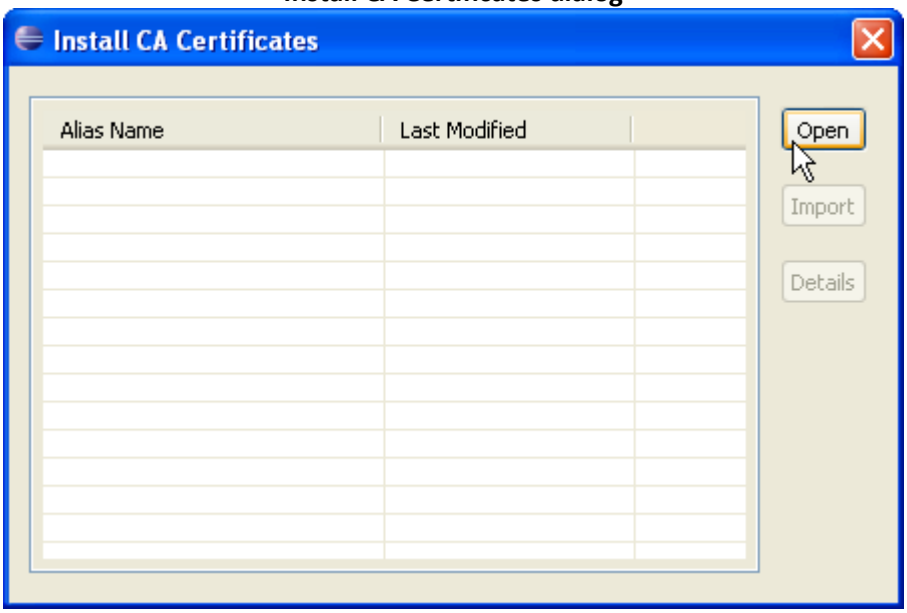
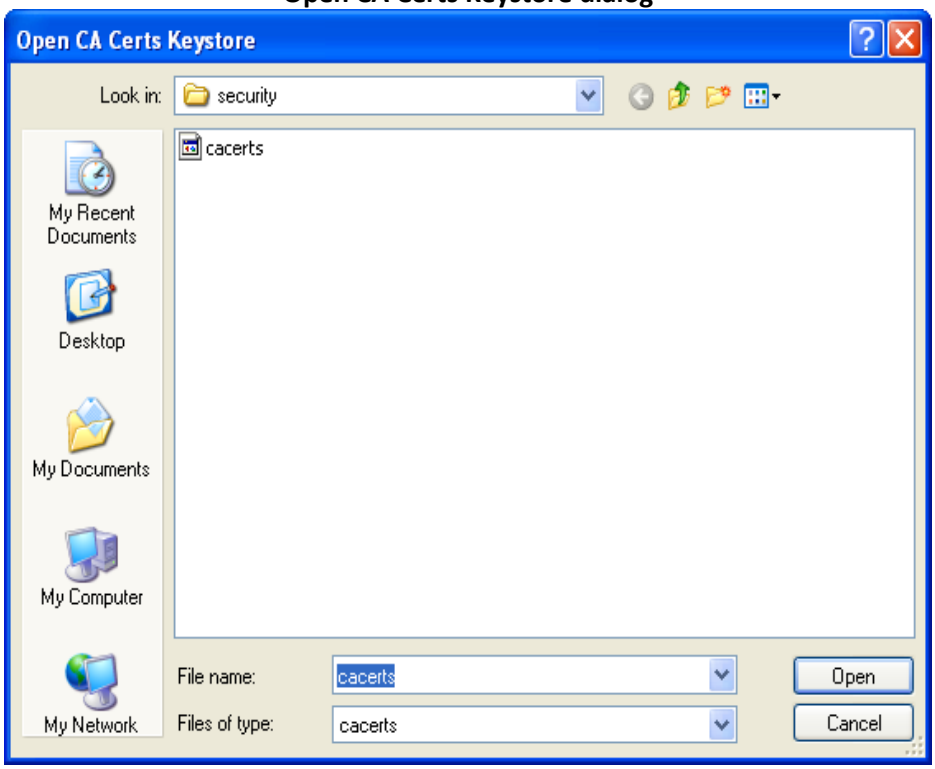
2. On clicking the feature, the **Install CA Certificates** dialog will be invoked (as shown below).

Install CA Certificates dialog



3. Click **Open**. The action will invoke the **Open CA Certs Keystore** dialog with **cacerts** file. Select it and click **Open**.

Open CA Certs Keystore dialog



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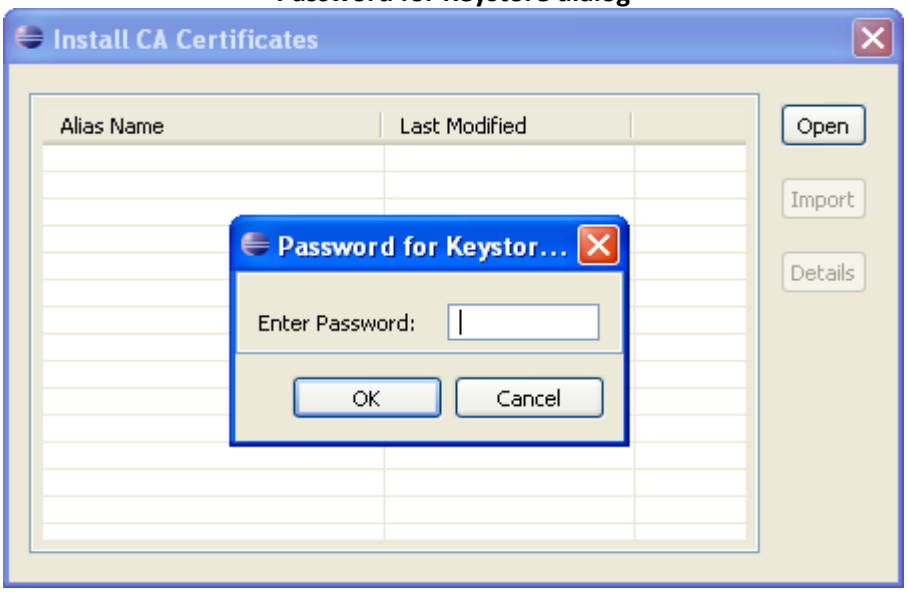
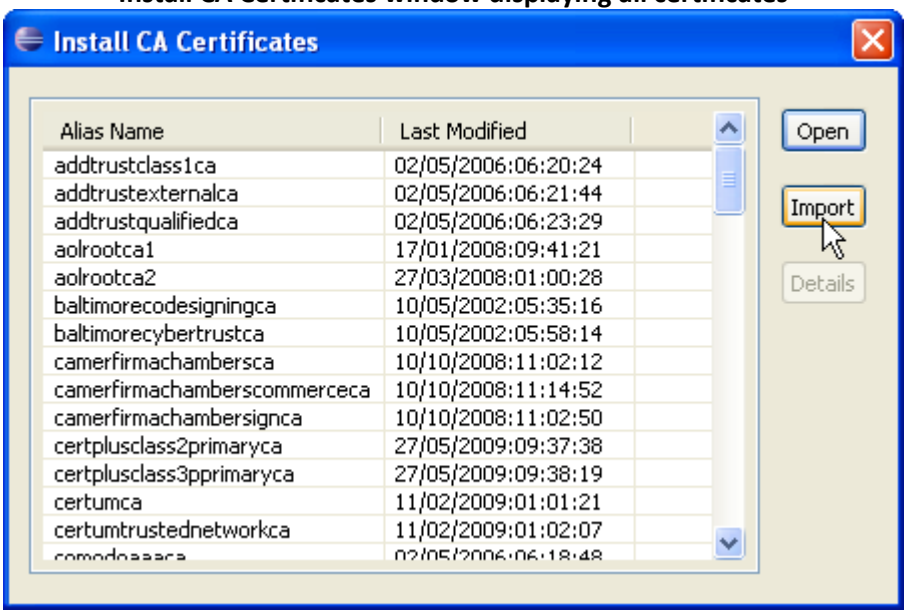
4. A new dialog is presented prompting you to enter the password for the Keystore. The default password is '**changeit**'.

Password for Keystore dialog



5. Enter the password and click **OK**. The **Install CA Certificates** dialog will now display the list of all the available certificates.

Install CA Certificates window displaying all certificates



6. Click **Import**, and select the Security Certificate issued from the iSeries. It would then get added to the list of certificates, providing you with the necessary authorization.

After performing these steps, check the 'Use SSL' box in the **Sign-on** dialog to begin using the feature.

Appendix L – Setting Status for Business Rules

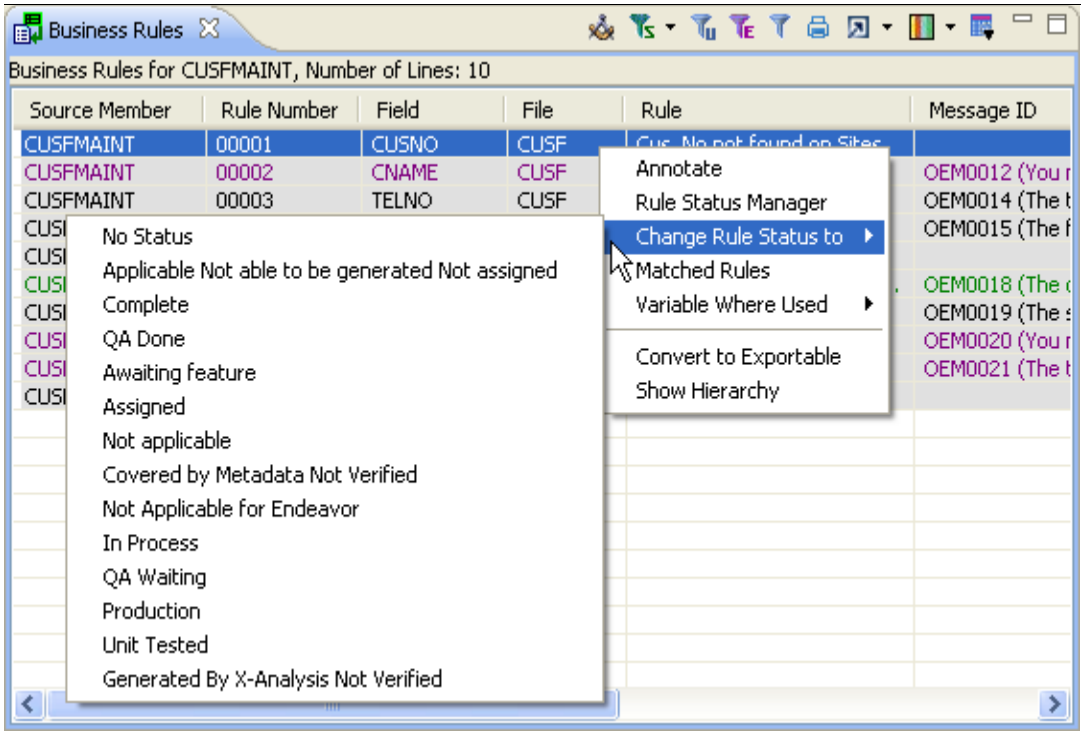
BUSINESS RULES STATUS*

When the user opts for the **Business Rules Overlay** or the **Business Rules** mode in the Source Editor, a new functionality allows him to set Rule Status for any rule.

Check the box – 'Allow editing in Consolidated Rules' from Window->Preferences->X-Analysis for full activation of these features.

The user can set comment and/or change the rule status for any rule. Select the right-click option, **Change Rule Status to**, for directly changing the rule status. A list of such possible status is already provided, and is shown in the image below:

Business Rules window – List of Rule Status



The user can view the history of how the rule status has changed through the **Rule Status Manager** option available on right click on a rule. The following image shows the **Rule Status Manager** dialog.

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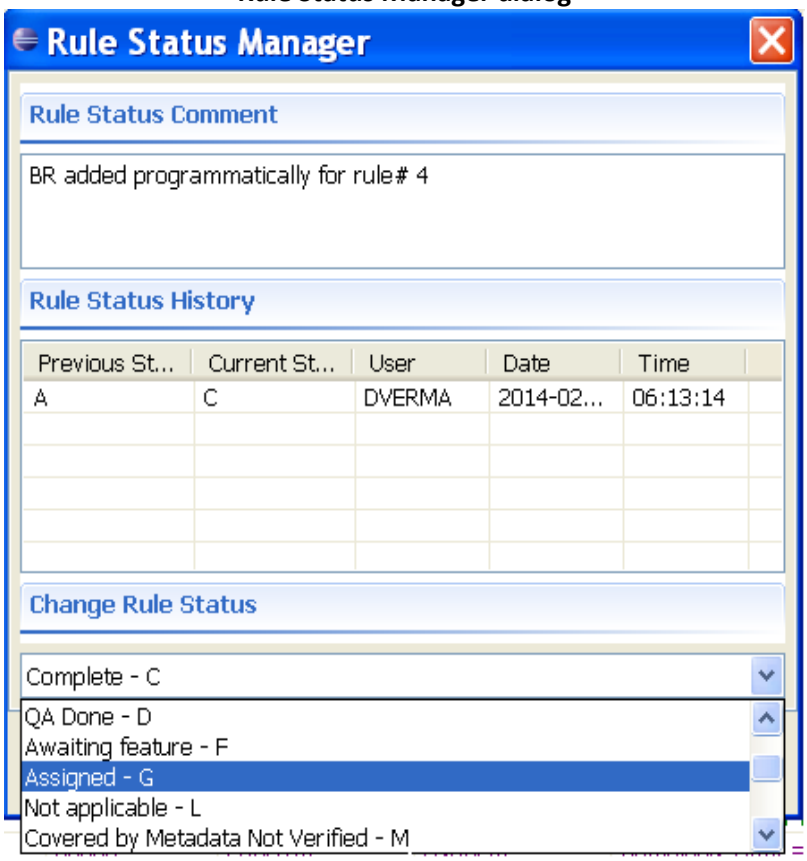
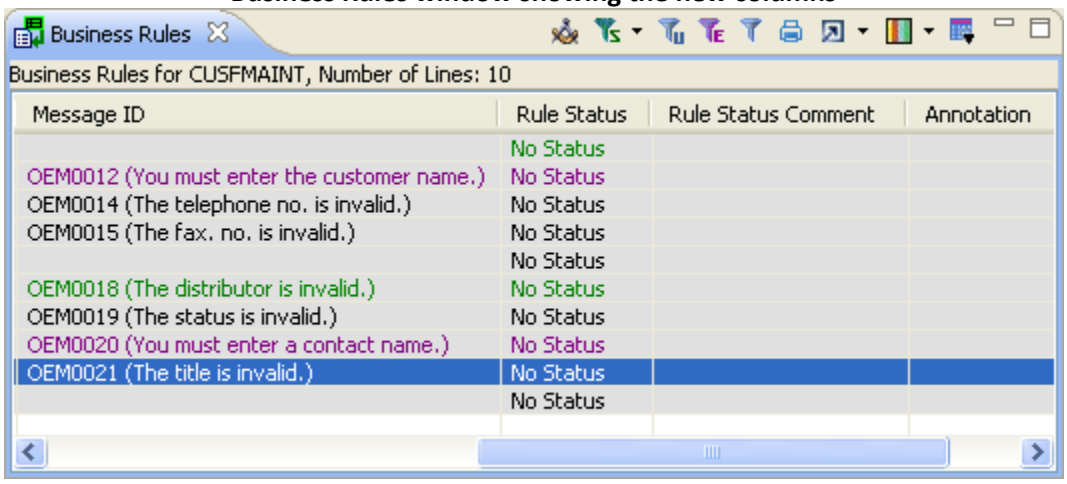
Rule Status Manager dialog



The Business Rules view displays new columns for Error Message, Business Rule Annotation, Rule Status, and Rule Status Comment. The columns are shown in the image underneath.

Business Rules window showing the new columns



The **Configure Columns** feature in the Business Rules view allows the user to manage the columns displayed. The user can reduce the width, or hide any column by setting width to 0.

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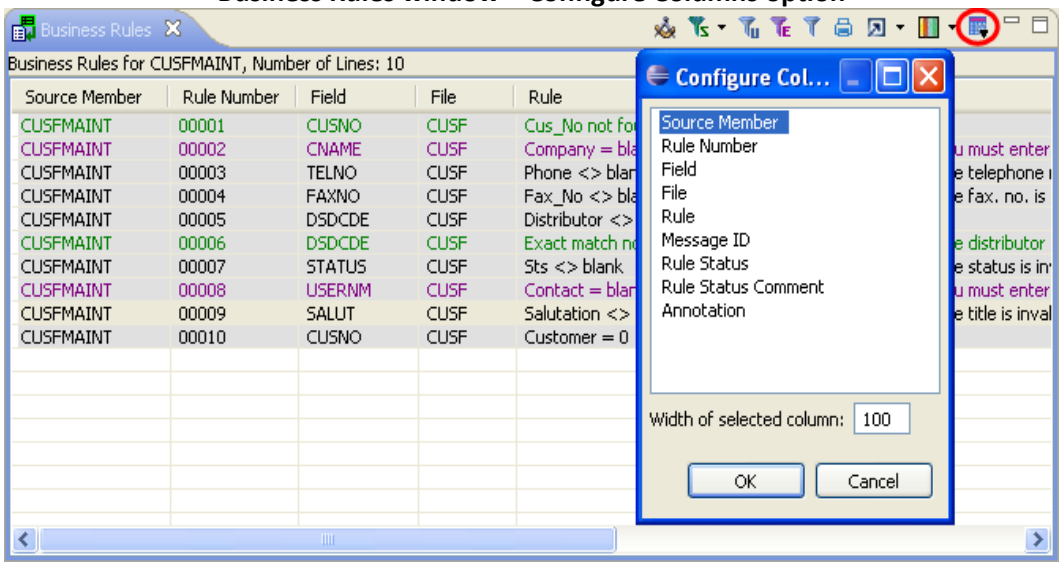
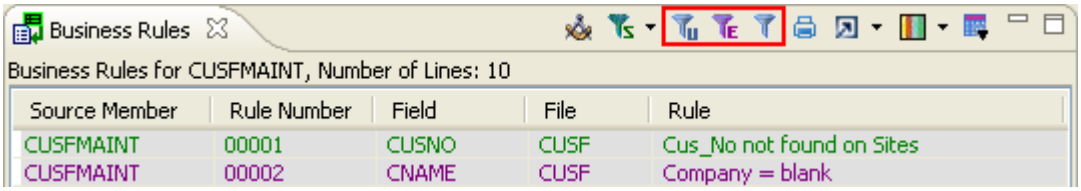
Business Rules window – Configure Columns option



There are various buttons for filtering the display of business rules. The rules are filtered based on whether they are **Exportable Rules**, **Update Rules**, or **Excluded Rules**. These three filters have toggle behaviour.

Business Rules window – Filter buttons



An additional option, **Filter by Rule Status** has also been provided to filter the rules on the basis of their status. Make the selection from the list of Rule Status in a drop-down menu.

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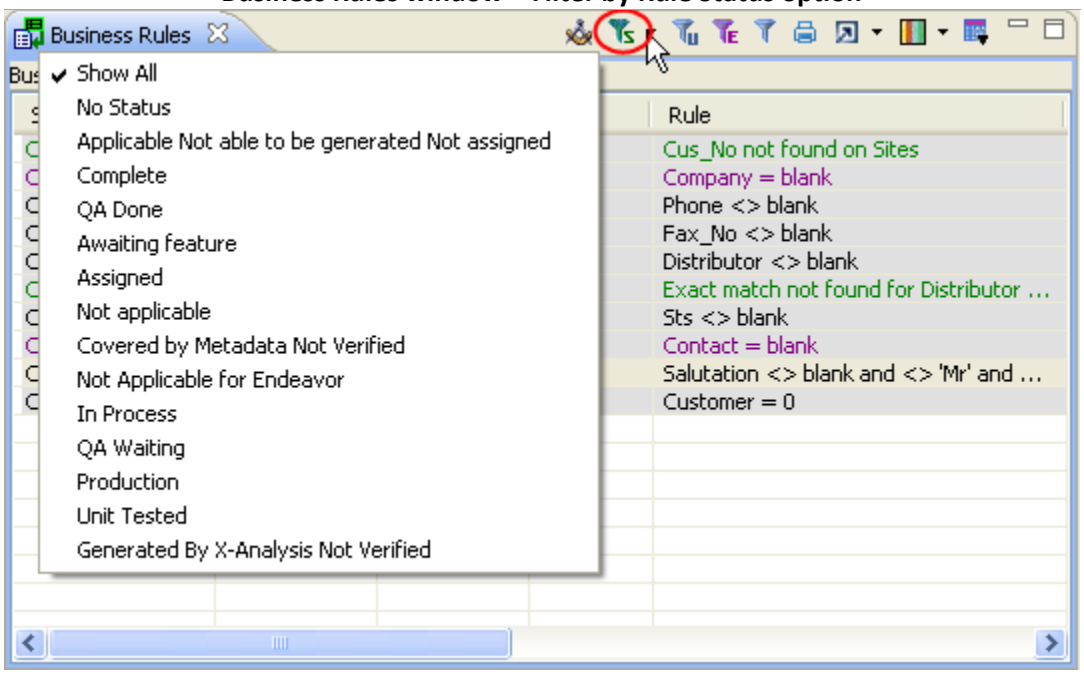
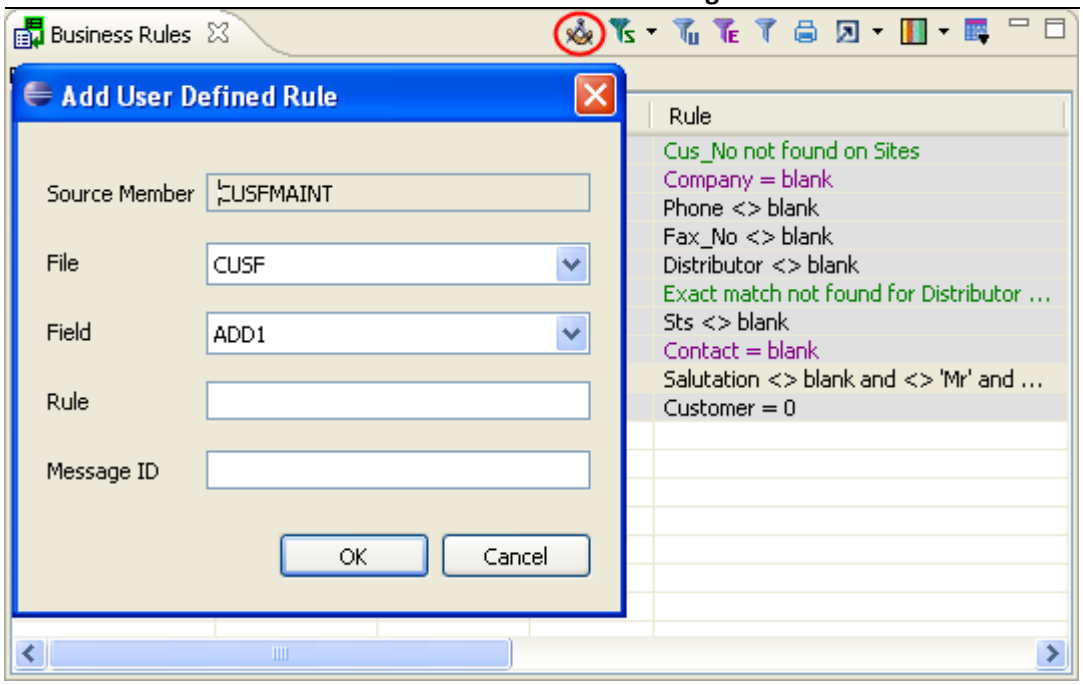
Business Rules window – Filter by Rule Status option



An option is included to allow the user to **Add User defined Rule**. Select the relevant File/Field and set the Rule text and error message ID. Such rules start from 60001, and are shown in a different color (orange). On selecting the option, the following dialog is invoked:

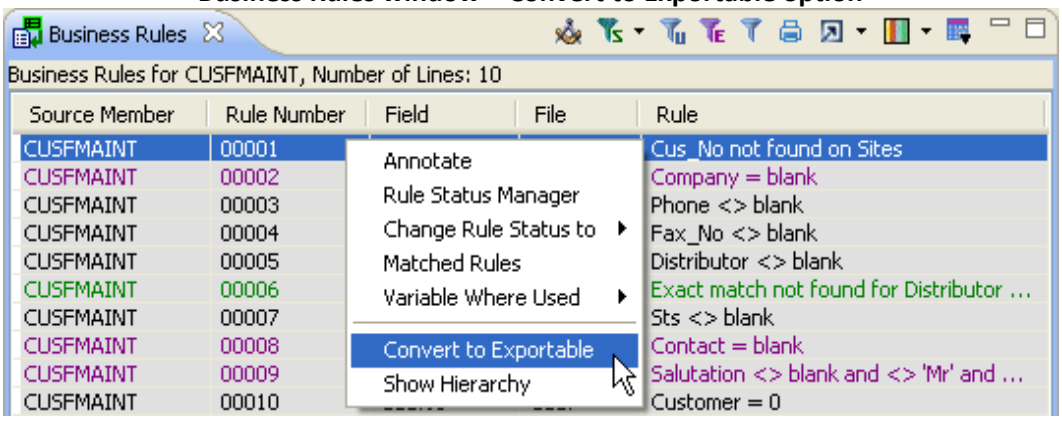
Add User Defined Rule dialog



Note: You may define a rule only when you have opted for the 'Business Rules' feature on an individual program from the Source Member view.

The user can also use a right-click option to convert a rule to 'Exportable/Non Exportable'. The option is displayed in the image below:

Business Rules window – Convert to Exportable option

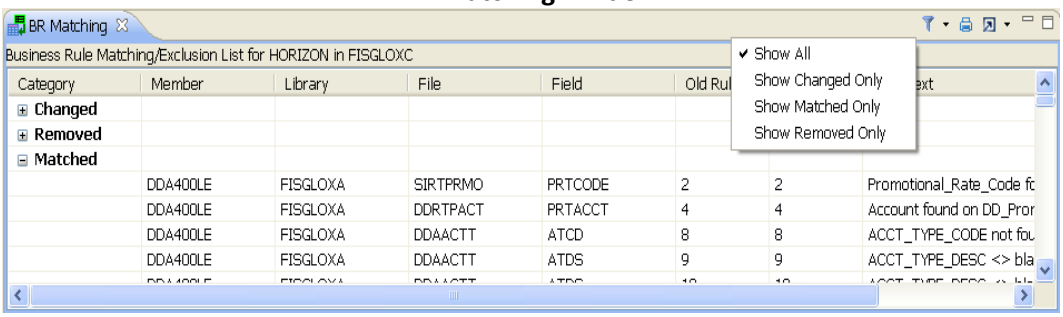


The X-Analysis client allows the user to view the Business Rules Matching/Exclusion list, produced as a result of a process on server which compares the existing cross-reference against an older one, and moves the Business Rule Status and Annotations from the older to the new cross-reference.

This report can be seen by the right-click option, **Business Rule Matching**, available on the context menu of the entire cross-reference, an application area, or a program. The report can be filtered to view only one of the types (Changed/Removed/Matched), and also exported to Word/PDF/Excel.

The following image shows Business Rule Matching view of application area, **HORIZON**.

BR Matching window



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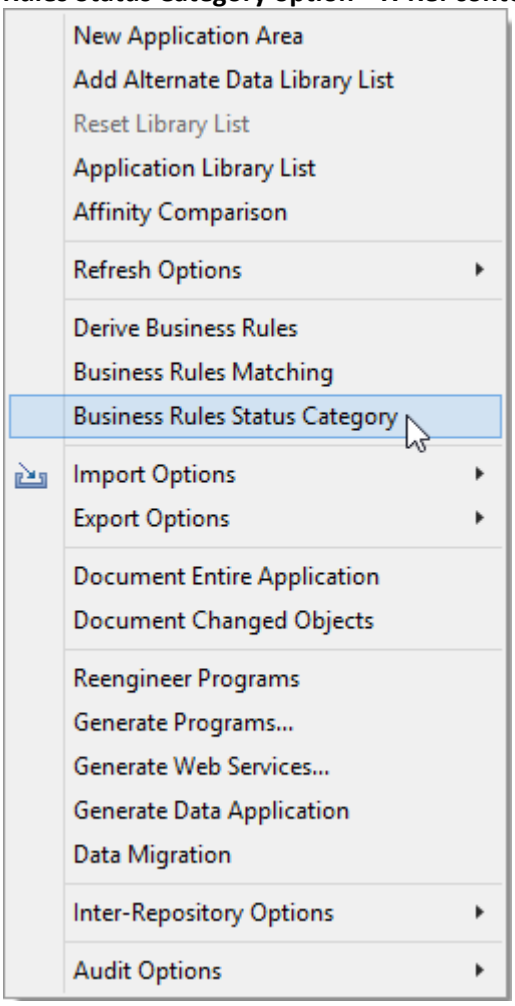
BUSINESS RULES STATUS CATEGORY

The **Business Rules Status Category** option is present on the context menu of the X-Ref library as is seen in the image ahead.

Business Rules Status Category option – X-Ref context menu



All the pre-set categories of Business Rules Status are displayed on clicking this option. The following window shows all the categories:

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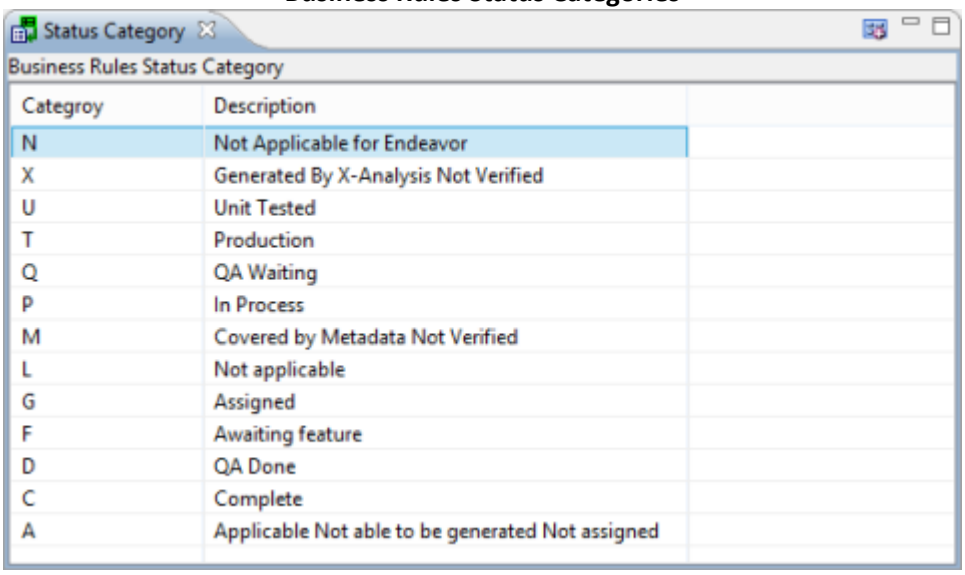
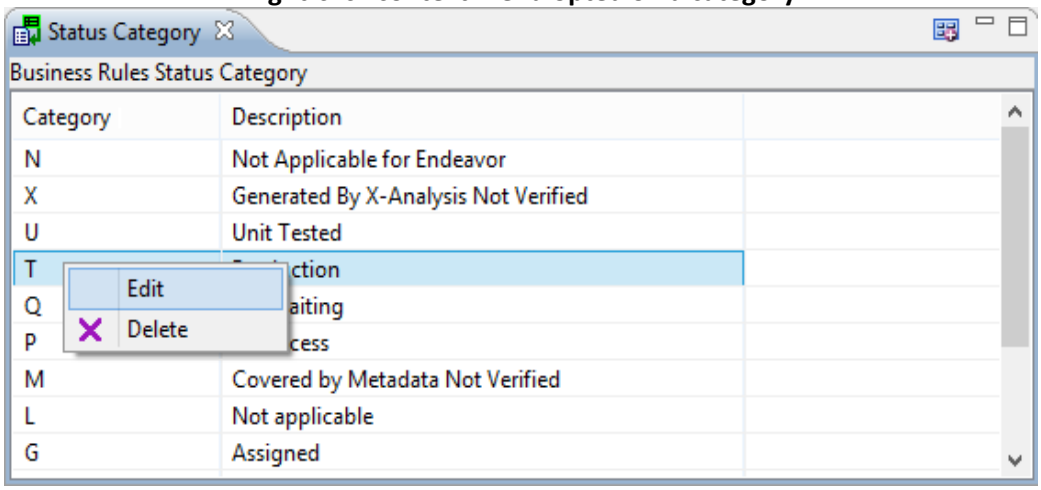
Business Rules Status Categories



The existing categories can be edited or deleted by using the right-click context menu on a specific category. The following image shows the context menu opted on a category.

Right-click context menu opted on a category



On selecting the **Edit** option, the following dialog box is invoked:

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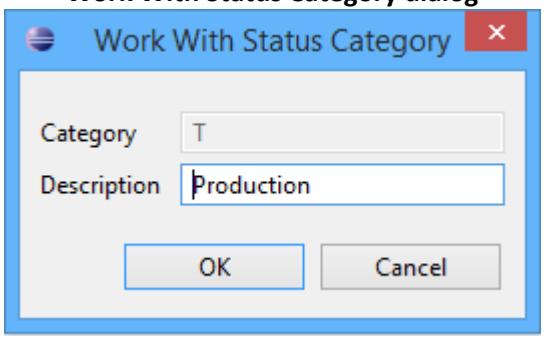
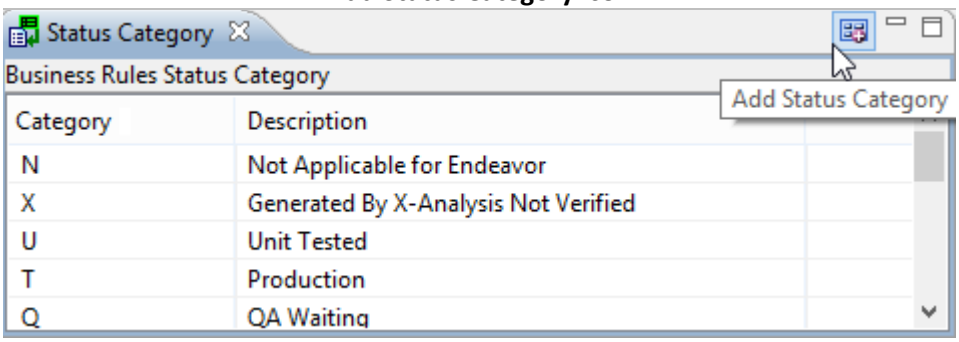
Work With Status Category dialog



In this dialog, the user may modify the description of the default category, as required.

On clicking **Add Status Category** icon on the Status Category toolbar, the same dialog as presented above is invoked. This time the user is able to assign a letter for the Category, besides the Description. The icon is indicated in the following image:

Add Status Category icon



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Appendix M – Export to Google Drive

You can now export DOCX and XLSX type to Google Drive. The use of Google Drive export requires Authorization setup. As the initial step, you will need to authorize the Google Drive, and then select the related options from X-Analysis Preferences.

The link provided below helps you with all the information related to the Google Drive Web APIs:

https://developers.google.com/drive/web/quickstart/quickstart-java

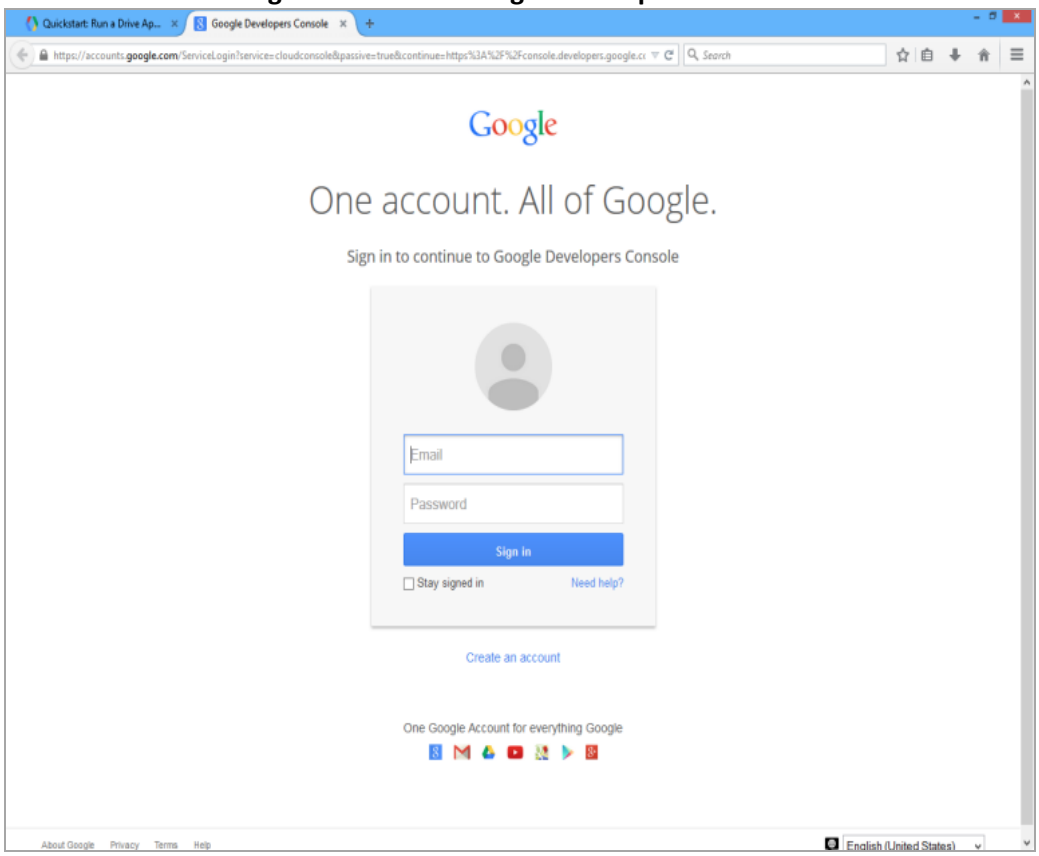
The steps to be followed are given as below:

1. Generate a Client ID/Client Secret for your google account. Click on the link:

https://console.developers.google.com//start/api?id=drive&credential=client_key

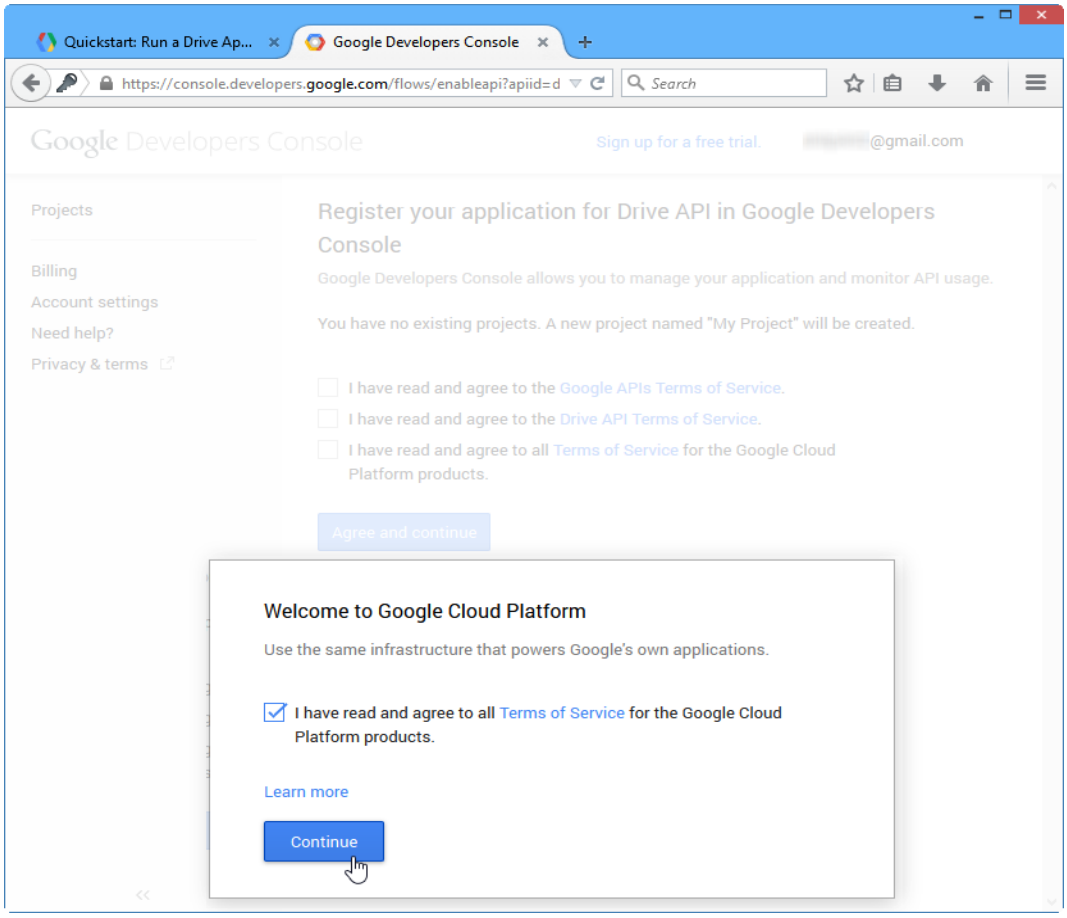
The following window will appear:

Sign in window – Google Developers Console



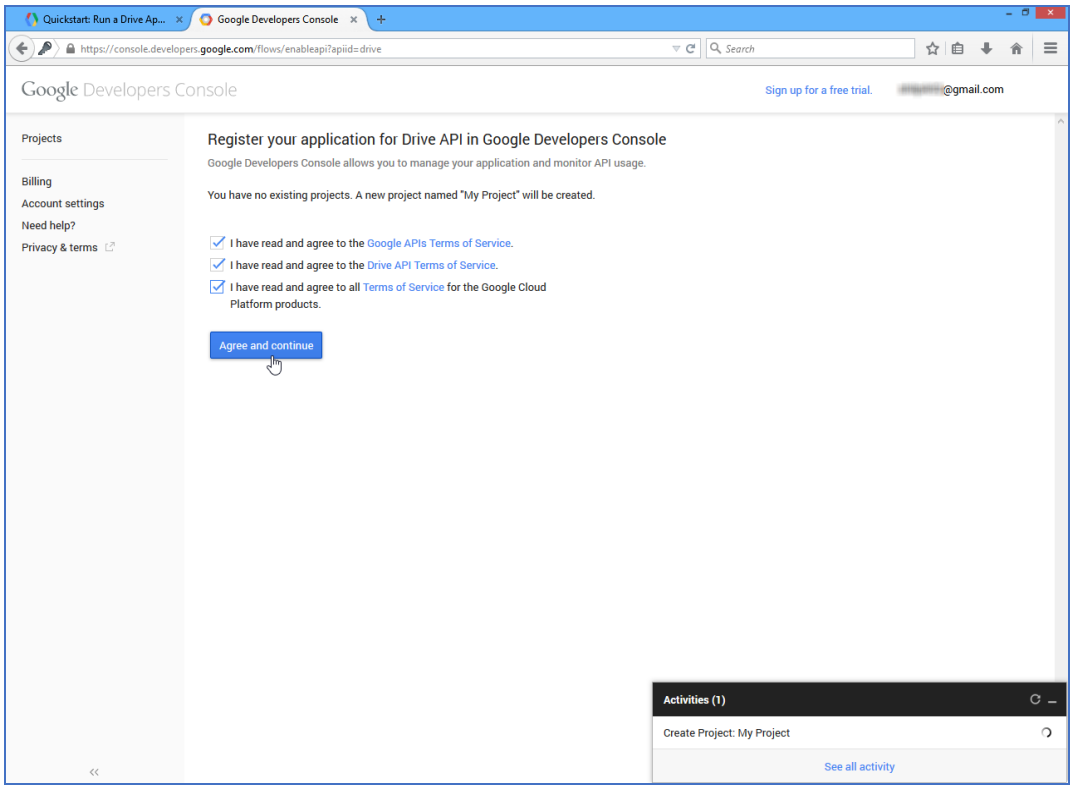
Sign in with your google email id and password.

2. After sign in is complete, the following registration window will appear:


Quickstart: Run a Drive Ap...
Google Developers Console
https://console.developers.google.com/flows/enableapi?apiid=d
Search
Google Developers Console
Sign up for a free trial.
@gmail.com
Projects
Billing
Account settings
Need help?
Privacy & terms
Register your application for Drive API in Google Developers Console
Google Developers Console allows you to manage your application and monitor API usage.
You have no existing projects. A new project named "My Project" will be created.
I have read and agree to the Google APIs Terms of Service.
I have read and agree to the Drive API Terms of Service.
I have read and agree to all Terms of Service for the Google Cloud Platform products.
Agree and continue
Welcome to Google Cloud Platform
Use the same infrastructure that powers Google's own applications.
I have read and agree to all Terms of Service for the Google Cloud Platform products.
Learn more
Continue

Check the box on the pop-up and click **Continue**.

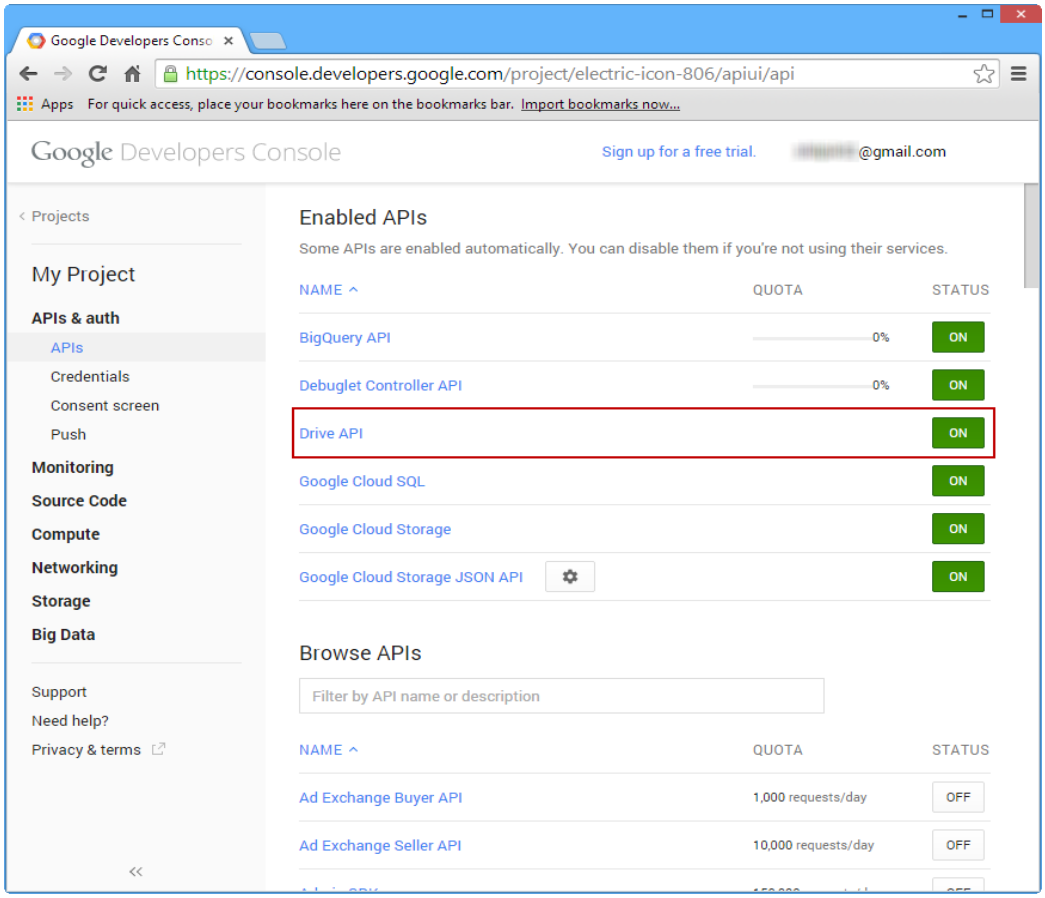
3. The following window will appear. Confirm the registration process by checking all the boxes.


Quickstart: Run a Drive Ap...
Google Developers Console
https://console.developers.google.com/flows/enableapi?apiid=drive
Search
Google Developers Console
Sign up for a free trial.
@gmail.com
Projects
Billing
Account settings
Need help?
Privacy & terms
Register your application for Drive API in Google Developers Console
Google Developers Console allows you to manage your application and monitor API usage.
You have no existing projects. A new project named "My Project" will be created.
I have read and agree to the Google APIs Terms of Service.
I have read and agree to the Drive API Terms of Service.
I have read and agree to all Terms of Service for the Google Cloud Platform products.
Agree and continue
Activities (1)
Create Project: My Project
See all activity

Click **Agree and continue**. A project will be created with the default name, **My Project**.

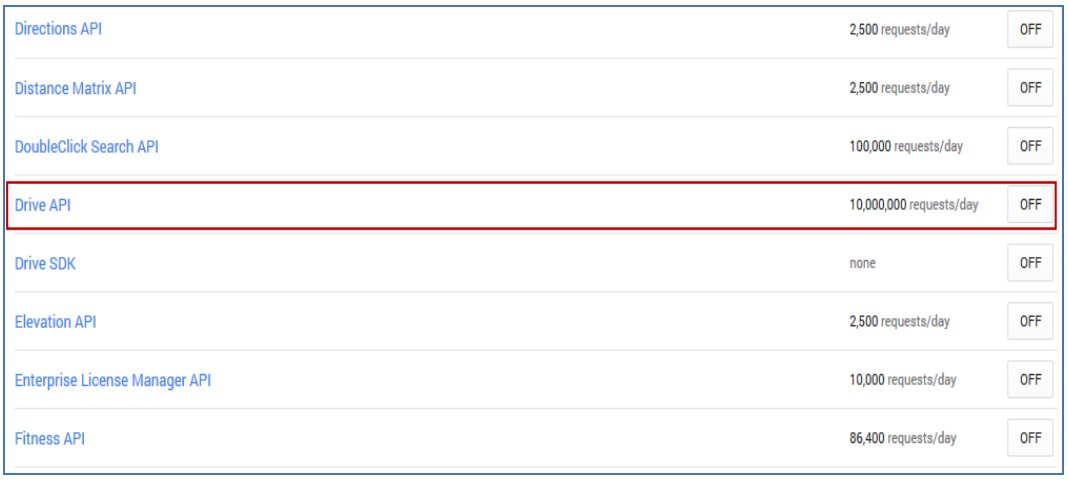
4. Under **My Project > APIs & auth**, click on **APIs**. Check that the **Drive API** is **ON** as displayed in the following image:

APIs window



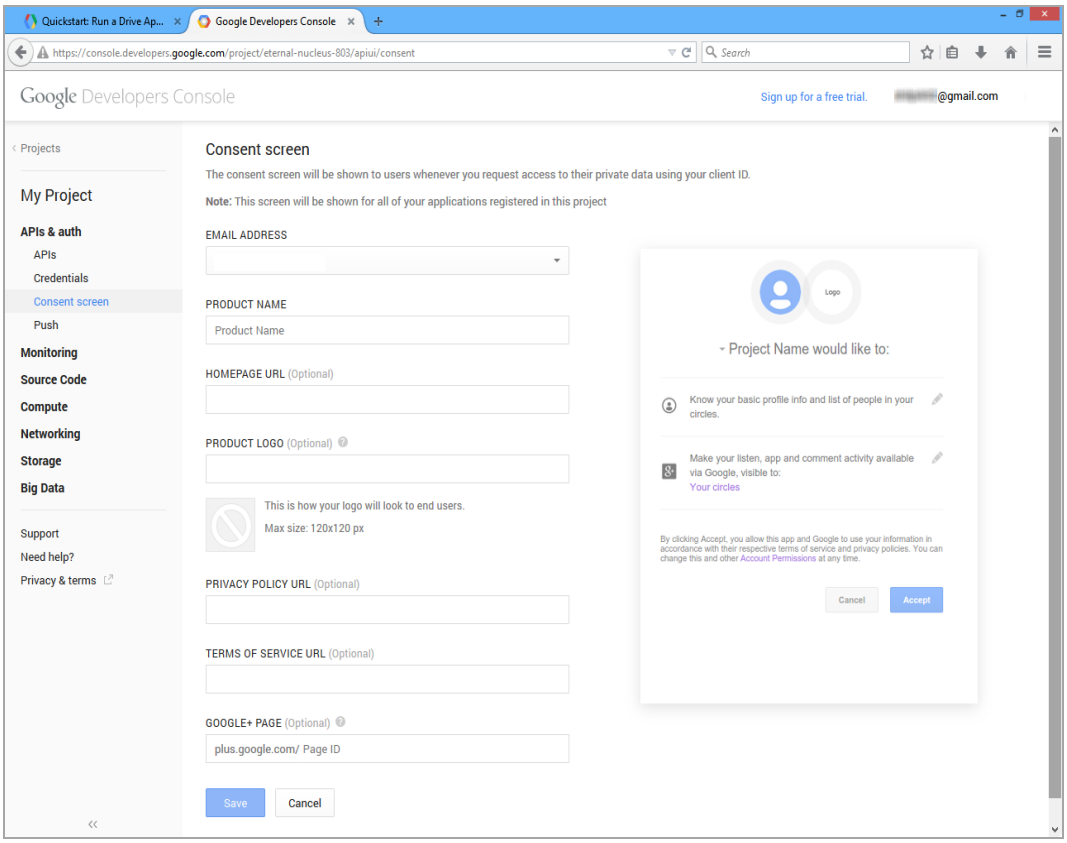
If not, locate it under **Browse APIs**. The image below shows **Drive API** as **OFF**. Click **OFF** to enable the feature.

Drive API under Browse APIs section


Directions API 2,500 requests/day OFF
Distance Matrix API 2,500 requests/day OFF
DoubleClick Search API 100,000 requests/day OFF
Drive API 10,000,000 requests/day OFF
Drive SDK none OFF
Elevation API 2,500 requests/day OFF
Enterprise License Manager API 10,000 requests/day OFF
Fitness API 86,400 requests/day OFF

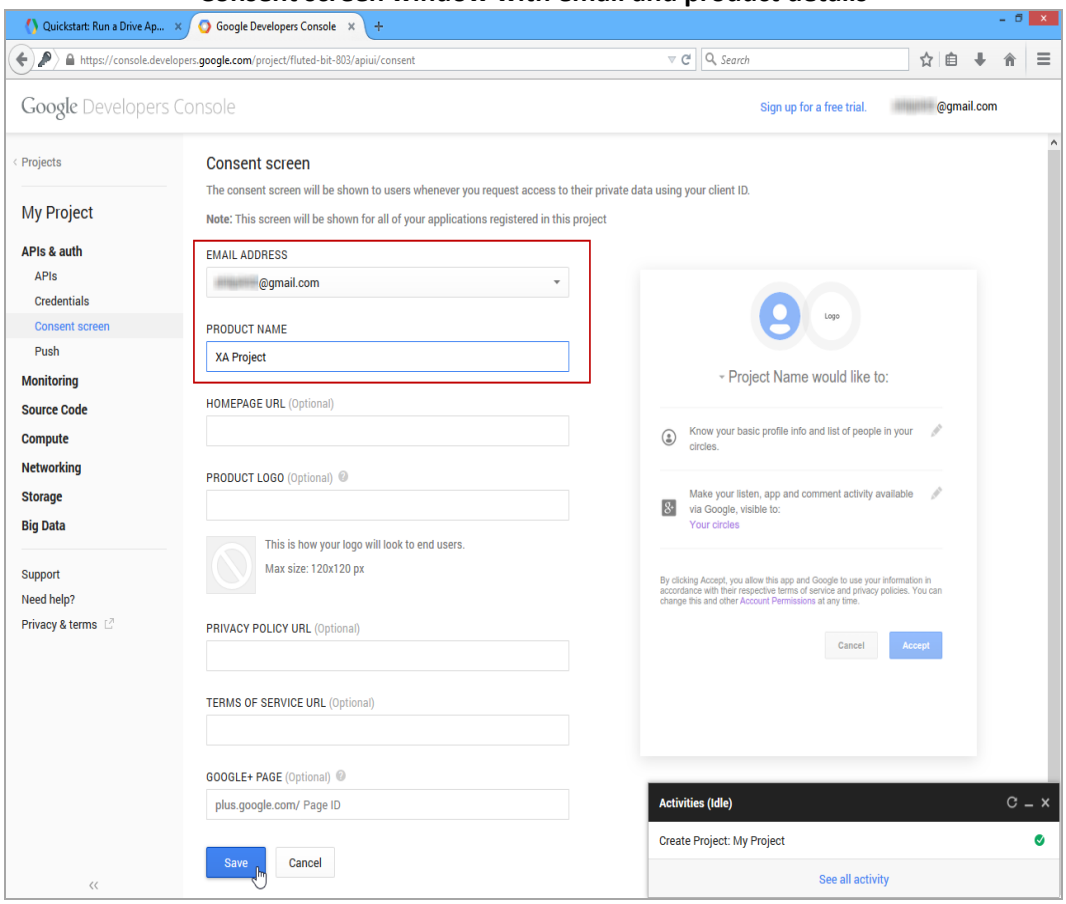
5. Under **My Project > APIs & auth**, click **Consent screen**. The following window will appear:

Consent screen window


Quickstart: Run a Drive Ap...
Google Developers Console
https://console.developers.google.com/project/eternal-nucleus-803/apiui/consent
Search
Google Developers Console
Sign up for a free trial.
@gmail.com
Projects
My Project
APIs & auth
APIs
Credentials
Consent screen
Push
Monitoring
Source Code
Compute
Networking
Storage
Big Data
Support
Need help?
Privacy & terms
Consent screen
The consent screen will be shown to users whenever you request access to their private data using your client ID.
Note: This screen will be shown for all of your applications registered in this project
EMAIL ADDRESS
PRODUCT NAME
Product Name
HOMEPAGE URL (Optional)
PRODUCT LOGO (Optional)
This is how your logo will look to end users.
Max size: 120x120 px
PRIVACY POLICY URL (Optional)
TERMS OF SERVICE URL (Optional)
GOOGLE+ PAGE (Optional)
plus.google.com/ Page ID
Save
Cancel
Logo
Project Name would like to:
Know your basic profile info and list of people in your circles.
Make your listen, app and comment activity available via Google, visible to:
Your circles
By clicking Accept, you allow this app and Google to use your information in accordance with their respective terms of service and privacy policies. You can change this and other Account Permissions at any time.
Cancel
Accept

Provide your email address and Product Name, as shown below:

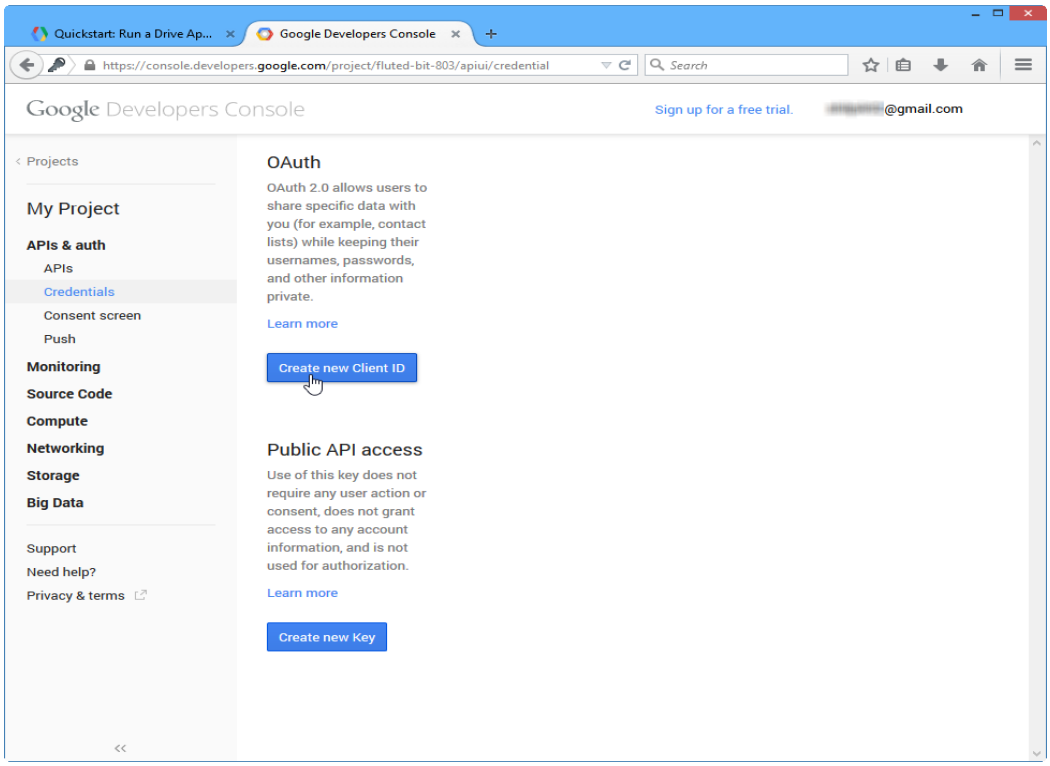
Consent screen window with email and product details


Quickstart: Run a Drive Ap...
Google Developers Console
https://console.developers.google.com/project/fluted-bit-803/apiui/consent
Search
Google Developers Console
Sign up for a free trial.
@gmail.com
Projects
My Project
APIs & auth
APIs
Credentials
Consent screen
Push
Monitoring
Source Code
Compute
Networking
Storage
Big Data
Support
Need help?
Privacy & terms
Consent screen
The consent screen will be shown to users whenever you request access to their private data using your client ID.
Note: This screen will be shown for all of your applications registered in this project
EMAIL ADDRESS
@gmail.com
PRODUCT NAME
XA Project
HOMEPAGE URL (Optional)
PRODUCT LOGO (Optional)
This is how your logo will look to end users.
Max size: 120x120 px
PRIVACY POLICY URL (Optional)
TERMS OF SERVICE URL (Optional)
GOOGLE+ PAGE (Optional)
plus.google.com/ Page ID
Save
Cancel
Logo
Project Name would like to:
Know your basic profile info and list of people in your circles.
Make your listen, app and comment activity available via Google, visible to:
Your circles
By clicking Accept, you allow this app and Google to use your information in accordance with their respective terms of service and privacy policies. You can change this and other Account Permissions at any time.
Cancel
Accept
Activities (Idle)
Create Project: My Project
See all activity

Click **Save**.

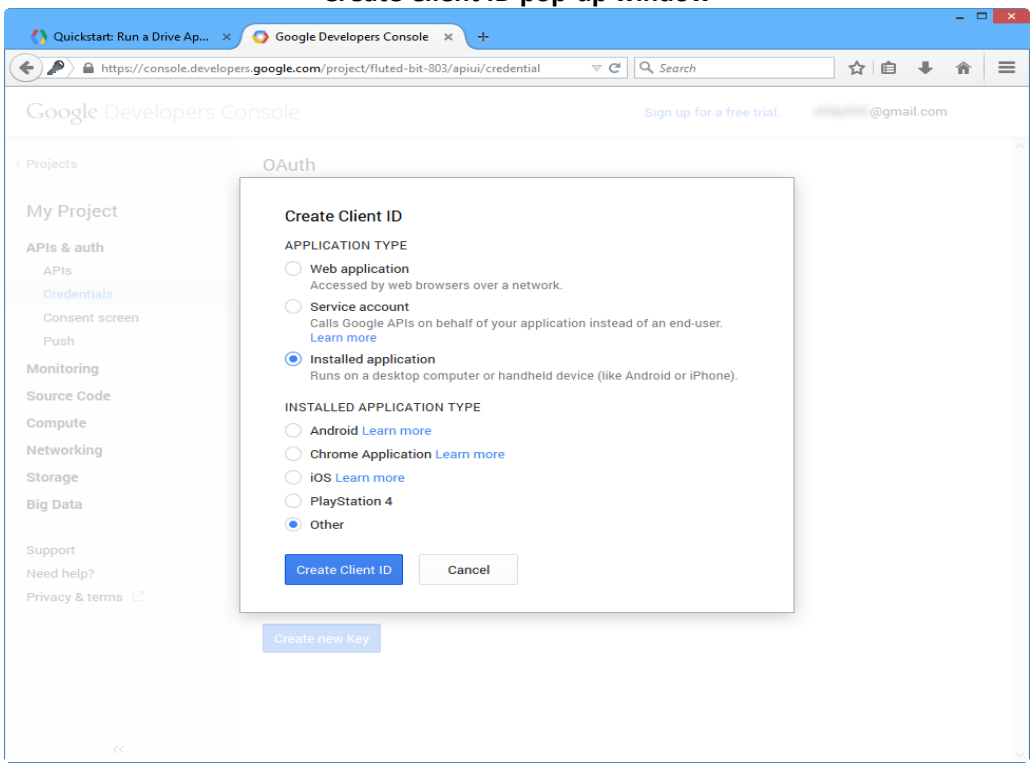
6. Now, click **Credentials** under **My Project > APIs & auth**. The following window will appear:

Credentials window



Click on **Create new Client ID**. The following pop-up window will appear:

Create Client ID pop-up window

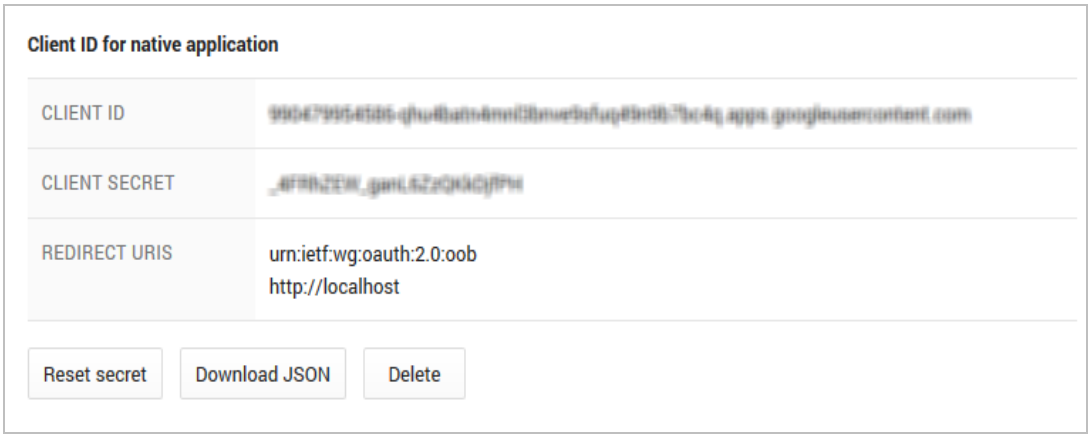


On the pop-up window, select **APPLICATION TYPE > Installed application** and **INSTALLED APPLICATION TYPE > Other**.

Click **Create Client ID**.

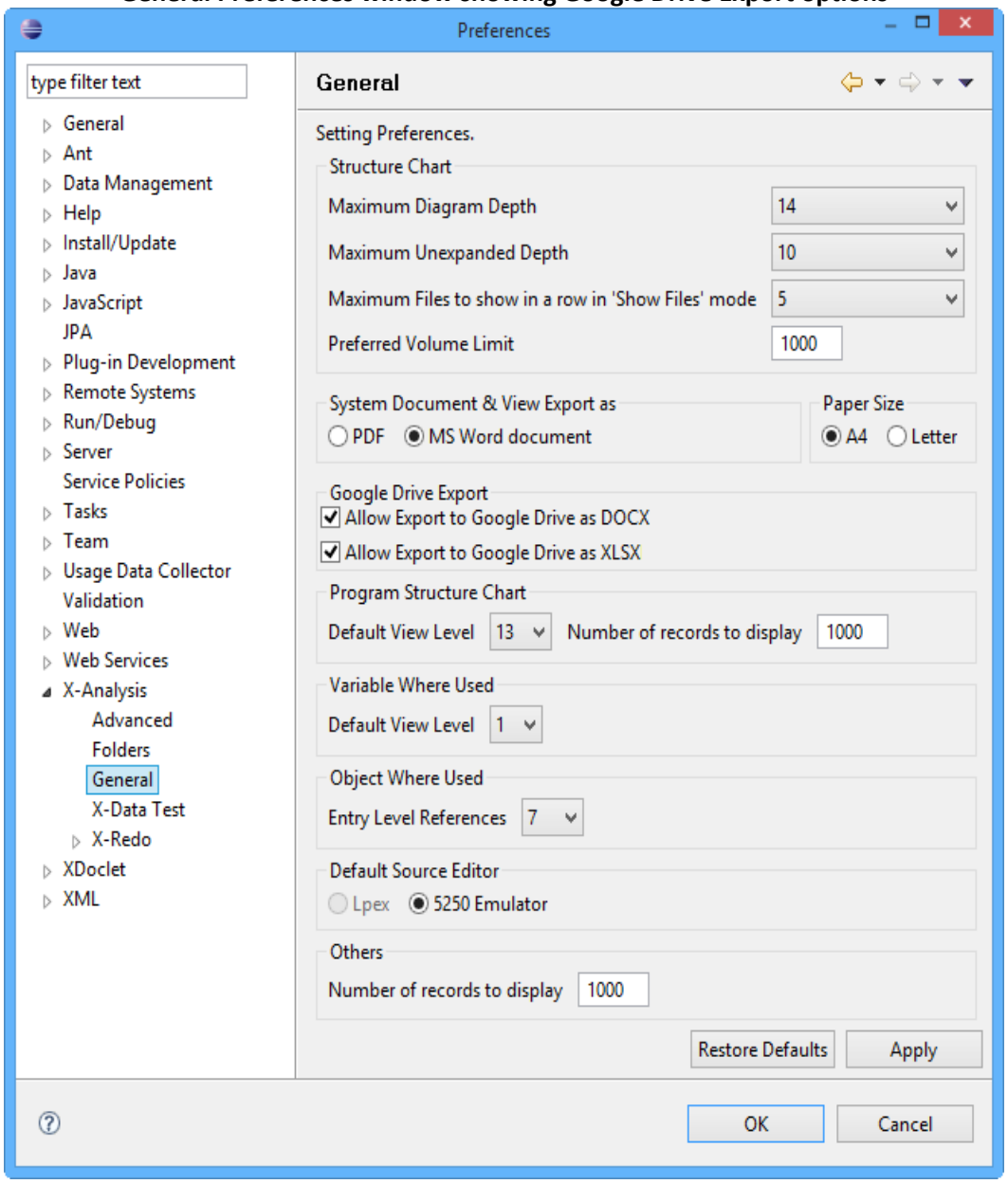
7. A window will appear displaying the **Client ID** and **Client Secret**. Please save the Client ID and Secret for later use.

Client ID and Client Secret



8. On the X-Analysis Client, check to allow options for **DOCX** and **XLSX** on the **Window>Preferences>X-Analysis>General**.

General Preferences window showing Google Drive Export options



9. Click the **Preferences>Advanced** tab. The following window will be displayed. Provide the saved **Google Client ID** and the **Google Client Secret** in the specified fields.

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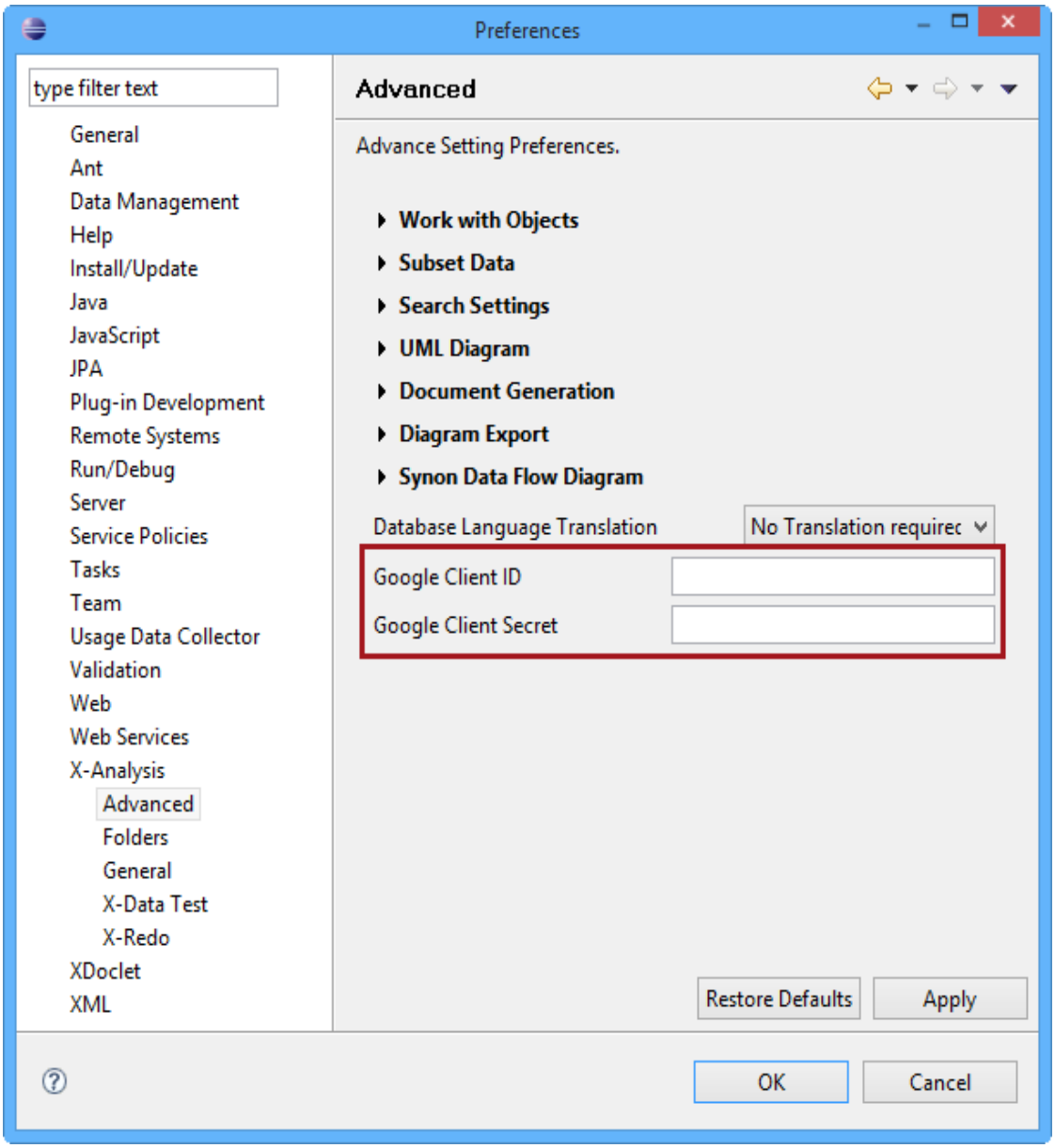
Advanced Preferences window



10. Click **Authorize Google Drive** from the **X-Analysis** drop-down menu.

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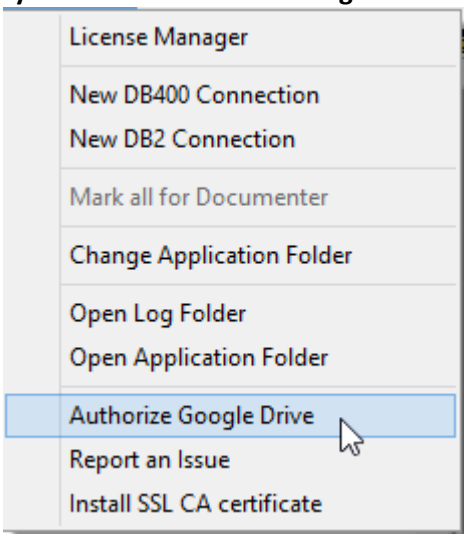
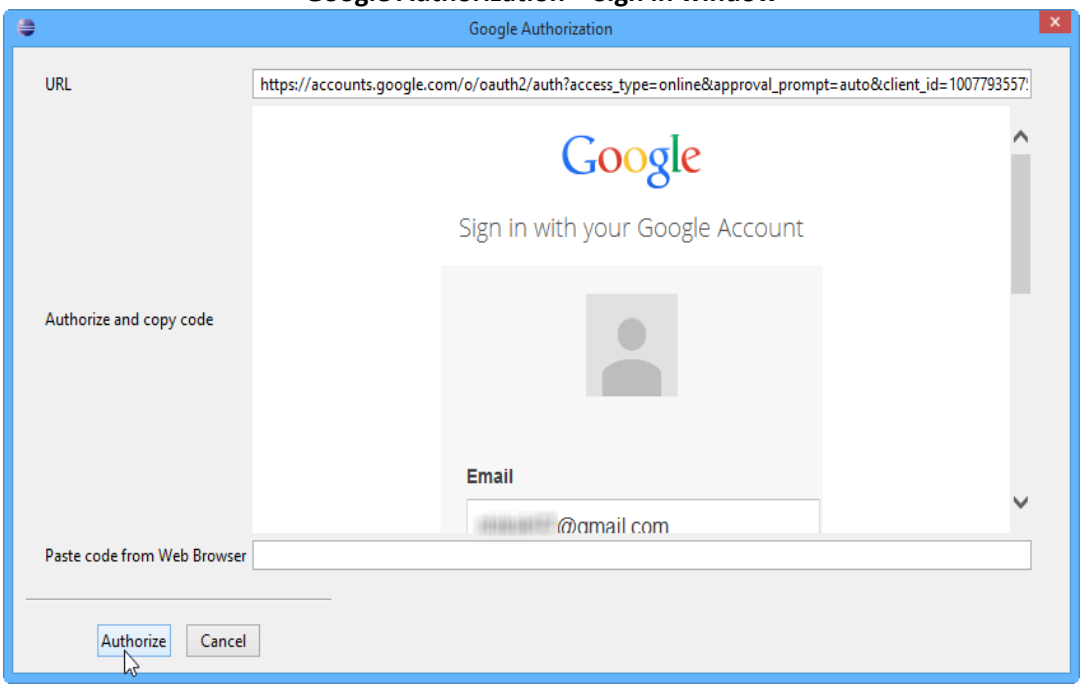
X-Analysis menu – Authorize Google Drive option



The Authentication URL using the Client ID and Secret will be automatically generated.

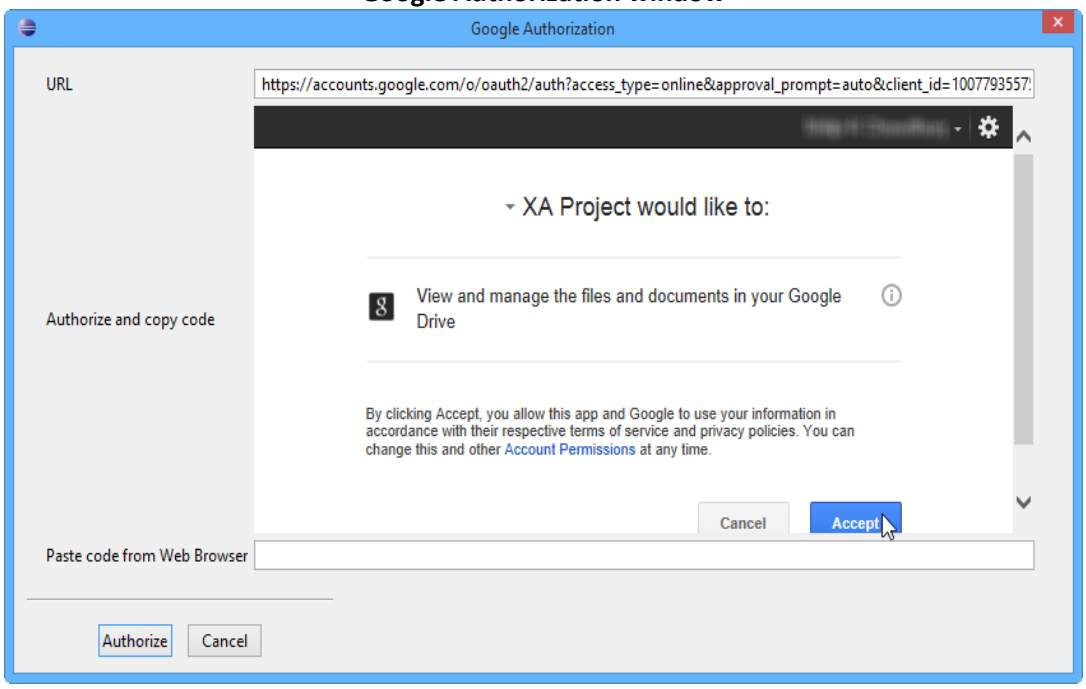
11. The **Google Authorization** window will appear. Sign in with your gmail id and password.

Google Authorization – Sign in window



12. After sign in, the following window will appear:

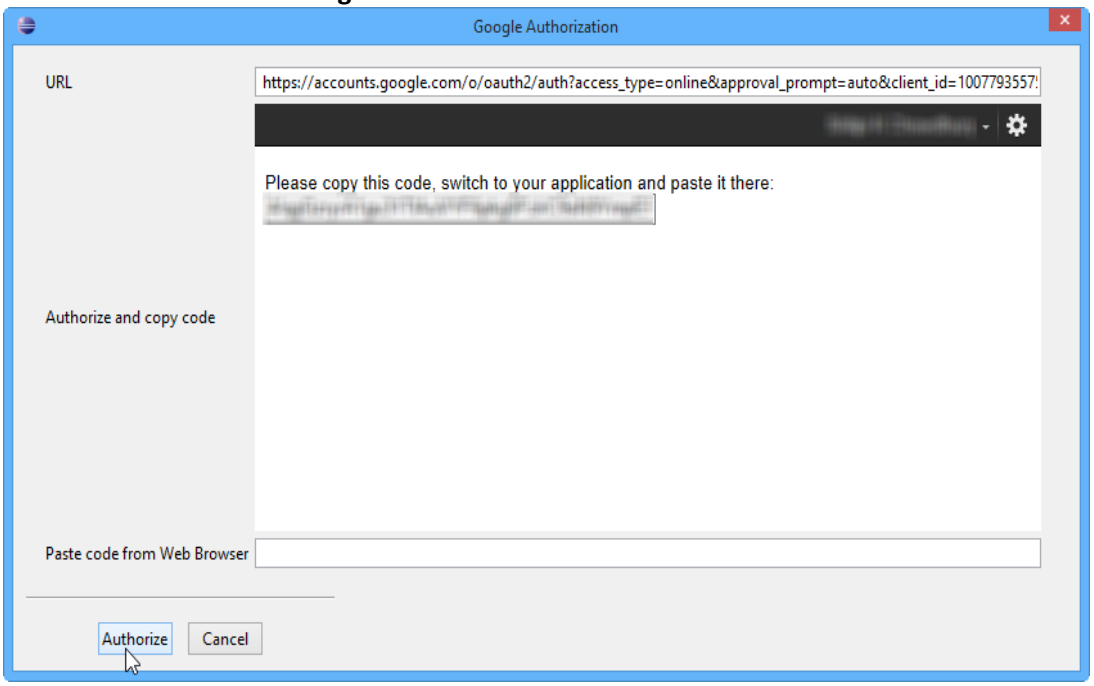
Google Authorization window


Google Authorization
URL
https://accounts.google.com/o/oauth2/auth?access_type=online&approval_prompt=auto&client_id=1007793557
XA Project would like to:
View and manage the files and documents in your Google Drive
By clicking Accept, you allow this app and Google to use your information in accordance with their respective terms of service and privacy policies. You can change this and other Account Permissions at any time.
Cancel
Accept
Authorize and copy code
Paste code from Web Browser
Authorize
Cancel

Click **Accept**.

13. The following window containing a code will appear. Copy and paste this code on the **Paste code from Web Browser** box.

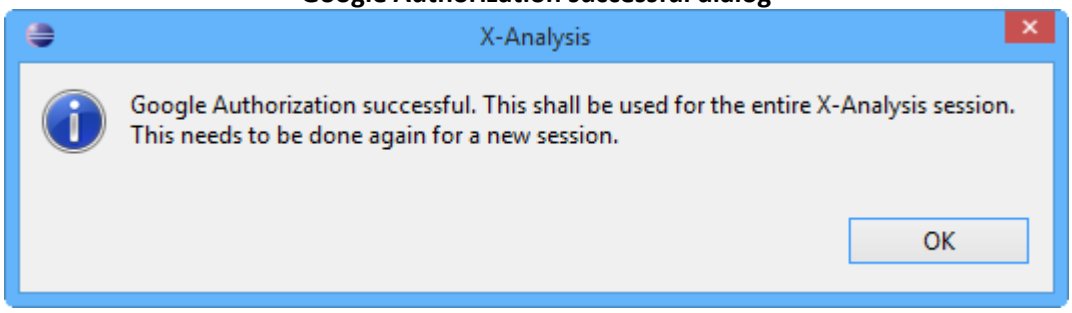
Google Authorization window – with code



Click **Authorize**.

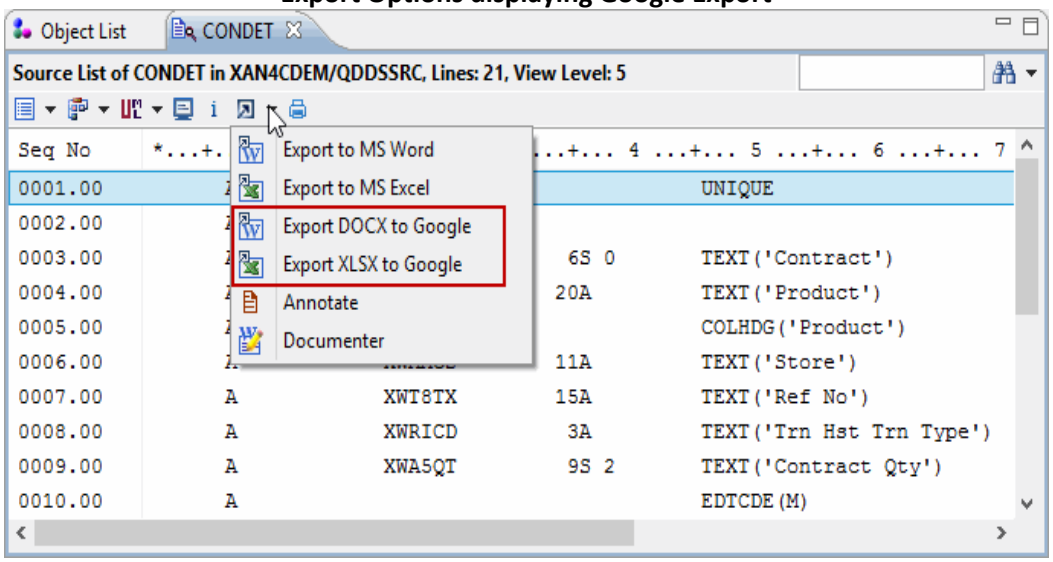
14. The following window will appear. Click **OK** to confirm the use of the Google Drive feature.

Google Authorization successful dialog


X-Analysis
Google Authorization successful. This shall be used for the entire X-Analysis session.
This needs to be done again for a new session.
OK

After completing these steps, you will see **Export DOCX to Google Drive** and **Export XLSX to Google** among the **Export Options**.

Export Options displaying Google Export



The document you select would be placed in the google drive, and can be checked using the web browser.

Note: Once authorized, the Google Export feature will work on an active session of X-Analysis. After you exit the X-Analysis platform, you will need to re-authorize the Google drive.

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Index

5250 Emulator, 51, 146
Access Path Diagram, 11, 198, 199
Action Diagram, 86, 395, 396, 398, 399, 404
Activity Diagram, 145, 195, 199, 200, 276, 277, 278, 280
Add Status Category, 435
Add User defined Rule, 431
Affinity Comparison, 61, 62, 102, 106, 107
Alternate Data Library, 57, 58, 59, 60
Annotation, 162, 164, 165, 221, 227, 356, 357, 429
Annotation Template, 357
APIs, 436, 438, 439, 441
Application Folder, 40, 41, 42, 68, 69, 304, 330, 353, 354, 408
Archive Data, 108, 294, 295, 296
AS400, 12
Attributes, 162, 165, 166, 167, 376, 379, 417, 421
Audit Options, 9, 74, 114, 241, 255, 262, 265, 275, 400
Bookmark, 133, 158, 159
Business Process Logic, 74, 140, 141, 142, 241, 254, 374, 395, 400, 401
Business Rule Matching, 432
Business Rules, 9, 11, 13, 17, 18, 19, 20, 21, 45, 65, 67, 68, 75, 84, 85, 107, 138, 139, 147, 148, 152, 207, 218, 219, 220, 223, 224, 225, 226, 227, 228, 229, 318, 324, 369, 374, 376, 381, 392, 395, 396, 397, 403, 416, 419, 420, 428, 429, 430, 431, 432, 433, 434
Business Rules Analysis, 9, 65, 223
Business Rules Overlay, 45, 138, 428
Business Rules Status Category, 433
Change Rule Status to, 428
Class Diagram, 47, 145, 207, 218, 221, 276, 278, 279, 280
Clean start Eclipse, 405
Component Status, 79, 80
Configure Columns, 228, 429, 430
Consolidated Rules, 45, 75, 84, 85, 139, 140, 428
Customised Libraries, 73, 230, 233, 234, 235
Data Content, 207, 215, 216, 219, 221, 320, 325, 366, 368, 372
Data Content Diagram, 216, 320, 325, 366, 372
Data Definition Language, 67, 302
Data Dictionary, 206, 281, 282, 283, 284, 285, 286, 287, 288
Data Flow Diagram, 11, 45, 47, 134, 144, 161, 162, 168, 169, 170
data library, 20, 57, 58, 59, 60
Data Management, 107, 108, 281, 288, 293, 294, 295, 296
data model, 13, 14, 15, 18, 19, 20, 21, 67, 88, 206, 218, 281, 282, 289, 290, 293, 298, 302, 303, 379, 380, 419
Data Model Diagram, 11, 134, 201, 203, 331, 339, 345, 349

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Data Modelling, 19, 27, 283, 285
DB2 Connection, 37, 239
DDL, 42, 67, 95, 116, 117, 118, 119, 120, 122, 123, 302, 303, 304, 305, 306, 307, 310
DDL conversion, 118, 119, 120, 122, 123
Development Screen, 87, 88
Difference Analysis, 73, 230, 231, 232
Document Application Area, 107, 328, 330, 342, 343
Document Manager, 9, 39, 40, 70, 107, 315, 316
Documenter, 38, 39, 149, 195, 207, 219, 220, 315, 316, 327, 356, 366, 408
Dreamweaver, 55, 213, 214
Eclipse, 12, 25, 28, 43, 55, 146, 212, 214, 403, 405, 406, 407, 409, 415, 424
Edit Problem Categories, 6, 74, 241, 270, 271, 272
entity relationship diagram, 19, 298
Excluded Rules, 430
Export Options, 67, 70, 107, 132, 149, 246, 253, 298, 299, 303, 305, 311, 316
Exportable Rules, 430
File Analysis, 118, 127
File Connection, 201
File Metrics, 74, 241, 253, 254
Filter by Rule Status, 430, 431
Flowchart, 145, 300, 301, 355
Function Attributes, 80
Function Editor, 207, 208, 209, 221
Function Logic, 277, 278, 279, 280
Function Type, 80, 172, 177, 185, 189, 192, 391
Generate Database Service Programs, 67, 69, 311
Generate Programs, 54, 72, 114, 402
generic file, 17, 23, 24
generic program, 23
Google Drive, 42, 50, 436, 444, 445, 446, 448
Graphical Editor Framework, 411
Hierarchical Structure Chart, 11, 144, 177, 178, 180
Hierarchy Exclusions, 16, 17, 172, 190
IBM i, 9, 12, 13, 19, 26, 27, 36, 44, 69, 97, 146, 230, 237, 239, 305, 311, 358, 407
Interactive Structure Chart, 50
Inter-Repository Options, 73, 230, 232, 234, 235, 236, 237
Inverted Structure Chart, 184, 185
Java, 55, 72, 73, 94, 358, 392, 393, 402, 403, 404, 410
Legend, 131, 132, 152, 153, 157, 168, 171, 182, 183, 184, 186, 188, 196, 199, 202, 355
LFs/Access Paths, 156, 198
License Manager, 28, 29, 31, 34, 35, 36
Manage Linked Repositories, 73, 230, 237, 238, 239
Member List, 74, 82, 83, 156, 276, 420
metadata, 87, 206, 282, 283, 285, 298, 302
Metrics History, 247, 248, 249
Migrated Logic, 397, 398
Narratives, 175, 176, 179, 180, 190

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New DB2 Connection, 37, 38, 359
New DB400 Connection, 36, 37
Object Allocation, 74, 264
Object Library, 187
Object List, 46, 74, 75, 76, 77, 78, 79, 98, 100, 147, 150, 155, 195, 324, 346, 400
Object Where Used, 16, 24, 51, 133, 134, 136, 150, 151, 152, 162, 185, 422
OLE Automation, 47, 356, 414, 415
Open Database Connectivity, 298
Open Office Draw, 47
Overridden Files, 174, 175
Overview Structure Chart, 11, 17, 186, 187, 188, 190, 192, 193, 331, 335, 339, 345, 349
Page Designer, 55, 207, 211, 212, 213, 214, 215, 221
Preferences, 43, 44, 45, 46, 48, 49, 51, 52, 53, 54, 55, 146, 147, 177, 212, 213, 214, 242, 243, 245, 252, 358, 359, 413, 414, 428
Preview Designer, 207, 211, 212, 221
Problem Analysis, 74, 118, 119, 122, 241, 262, 263, 275, 385
program logic, 20, 21, 170, 218
Program Structure Chart, 11, 50, 134, 144, 185, 186
pseudo code, 84
PTF Analysis, 73, 230, 233, 234, 235, 236
Purge Data, 108, 295, 296, 297
RDi, 411
Referred Files, 180, 181
Re-generate Programs, 403
Relationship Details, 285, 287, 288
Reset Perspective, 406
RPG environment, 420
Rule Status Manager, 428, 429
Runtime Environment, 413, 415, 424
Screen Action Diagram, 217, 320, 325, 366, 373
Screen Components, 9, 71, 72, 75, 85, 86, 87, 145, 146, 207, 215, 217, 218, 219, 222, 366
Screen Flow Diagram, 144, 195, 196, 197, 198
Screen Metrics, 74, 241, 250, 251, 252, 253
Screen Source Code, 207, 208
Screen/Report Design, 146, 193, 194, 195, 409
Signon, 25, 26, 360, 410, 425, 427
Source archiving, 269
Specialized Analysis, 74, 241, 254, 255, 256, 257, 260, 261, 262
Spool File, 112, 113, 114, 420
Structure Chart Diagram, 11, 17, 134, 144, 170, 171, 173, 174, 175, 176, 177
Structured Query Language, 302
Subset Data, 47, 108, 293, 294
Summary Report, 74, 241, 265, 266, 267, 268
Synon, 12, 15, 20, 47, 169, 171, 183, 184, 188, 202, 388, 389, 390, 391
SYNON, 379, 420
Test Process, 108, 109
UML Options, 114, 276, 280

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Update Rules, 430
Use SSL, 27, 425, 427
V2, 28
Variable Program Calls, 21, 22
Variable Where Used, 50, 51, 133, 134, 151, 152, 153, 154, 155, 422
Verification, 289, 290, 291
X-2E, 2, 376, 378, 379, 388, 389
XALicenseManagerTool, 28, 29
X-Analysis, 1, 2, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 36, 37, 38, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 53, 55, 56, 57, 58, 67, 73, 74, 75, 84, 88, 97, 107, 116, 133, 135, 146, 147, 149, 153, 159, 160, 169, 177, 206, 212, 213, 221, 223, 224, 226, 231, 232, 234, 235, 236, 238, 248, 268, 275, 276, 278, 281, 282, 285, 290, 293, 298, 299, 300, 302, 303, 304, 306, 309, 310, 315, 317, 326, 353, 356, 358, 359, 360, 361, 366, 367, 370, 371, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 388, 389, 395, 399, 405, 406, 407, 408, 409, 410, 413, 414, 415, 416, 417, 418, 419, 420, 422, 423, 424, 425, 428, 432
  Suite of products, 10
X-Analysis Client, 9, 13, 25, 27, 46, 47, 97, 149, 303, 358, 405
X-Analysis Perspective, 25, 26, 278, 395, 405, 406
X-Extract, 223, 420

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